EXCAVATING ENGINEER

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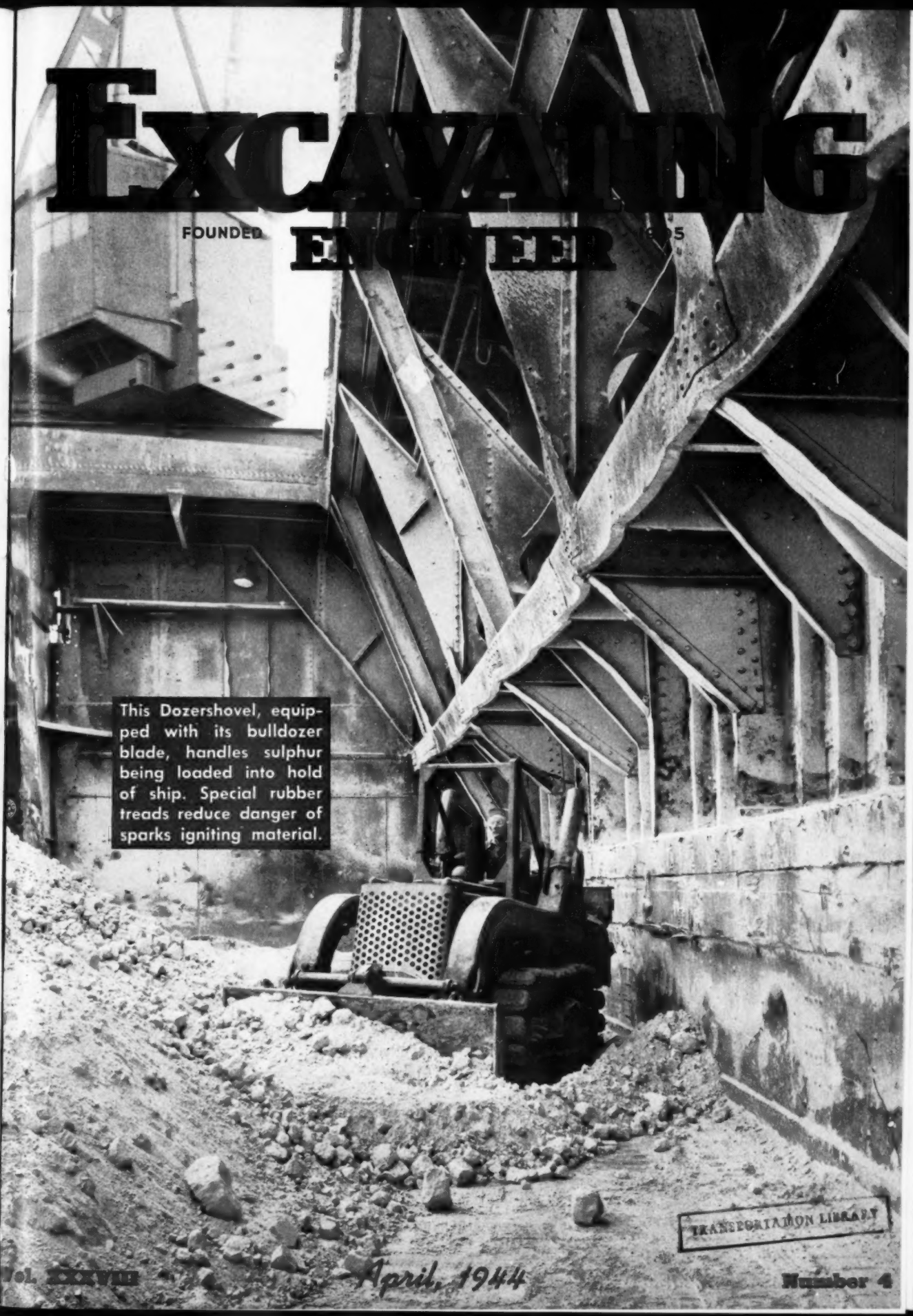

This Dozershovel, equipped with its bulldozer blade, handles sulphur being loaded into hold of ship. Special rubber treads reduce danger of sparks igniting material.

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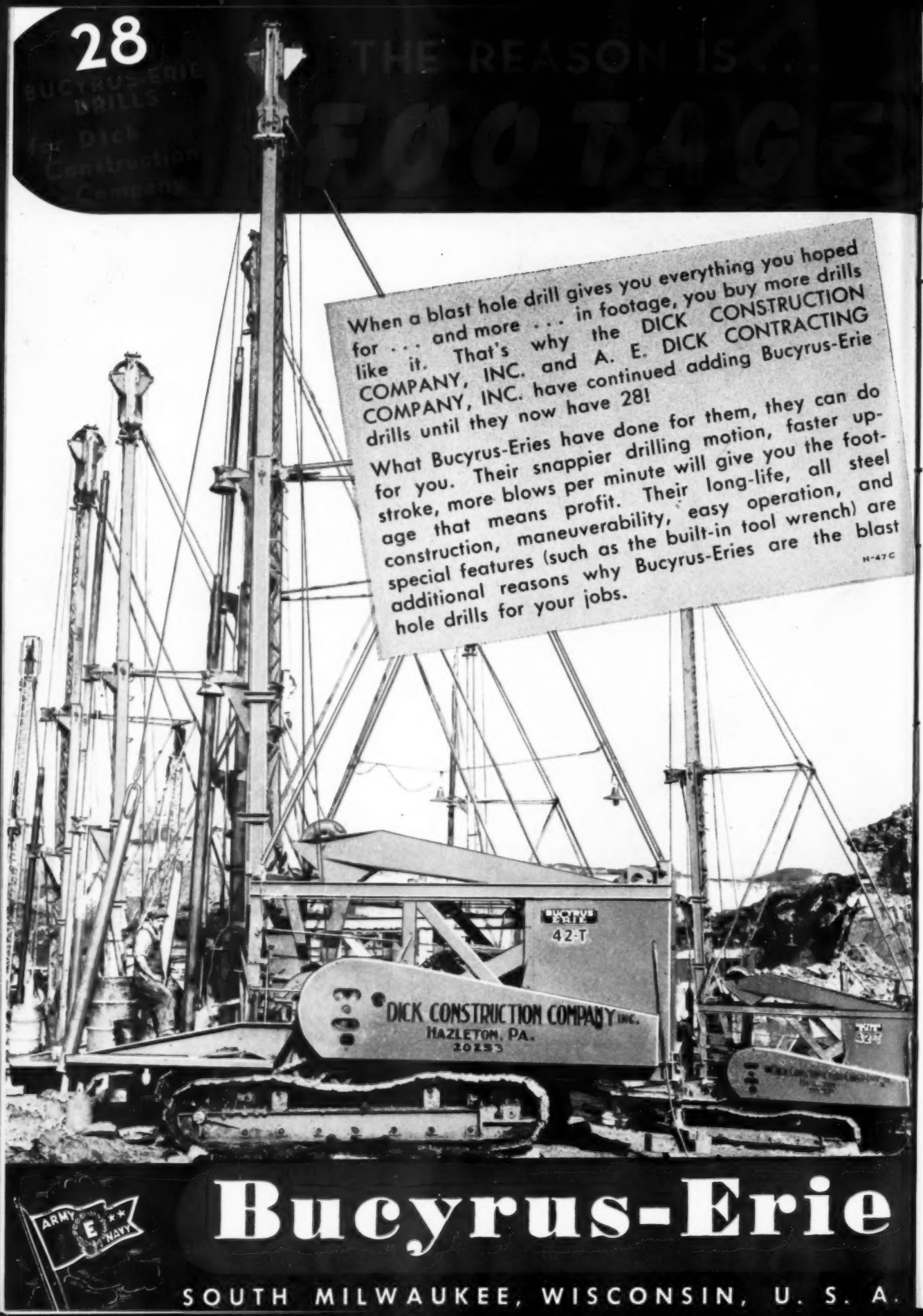
Vol. XXXVIII April, 1944 Number 4


28
THE REASON IS ...
FOOTAGE
When a blast hole drill gives you everything you hoped for . . . and more . . . in footage, you buy more drills like it. That's why the DICK CONSTRUCTION COMPANY, INC. and A. E. DICK CONTRACTING COMPANY, INC. have continued adding Bucyrus-Erie drills until they now have 28!
What Bucyrus-Eries have done for them, they can do for you. Their snappier drilling motion, faster up-stroke, more blows per minute will give you the footage that means profit. Their long-life, all steel construction, maneuverability, easy operation, and special features (such as the built-in tool wrench) are additional reasons why Bucyrus-Eries are the blast hole drills for your jobs.
H-47C
BUCYRUS ERIE
42-T
DICK CONSTRUCTION COMPANY INC.
HAZLETON, PA.
20253
ARMY E NAVY
Bucyrus-Erie
SOUTH MILWAUKEE, WISCONSIN, U. S. A.

PALS FOR YEARS

Ever since 1912, when Ingersoll-Rand brought out the first "Jackhamer," these machines have been "pals" of the men who operate them. Typical of the way drill runners feel about "Jackhamers"* is the following paragraph from a recent letter:

"I have used Jackhamers these past ten years and am proud to say that they are the best to handle and the fastest machines on the market. Give me an Ingersoll-Rand every time."

The JB-5, our "Jackhamer" in the 55-pound class, is the easiest-holding machine we have ever built in this popular size. Reports from the field prove that operators drill more feet of hole per shift with it because of the Easy-Holding feature. The man's energy is used to cut rock—not to fight, power-wasting, destructive recoil. Peak performance is maintained hour after hour throughout the length of the shift...and in addition, upkeep costs are lower because of the reduced vibration and smooth flow of power which is made possible by a refined valve action.

For further details on how the JB-5 can help you increase your footage, consult our nearest engineering service division.

*Only Ingersoll-Rand makes "Jackhamers" (registered I-R trademark).

SOLVE YOUR DRILLING PROBLEMS WITH IR JACKBITS

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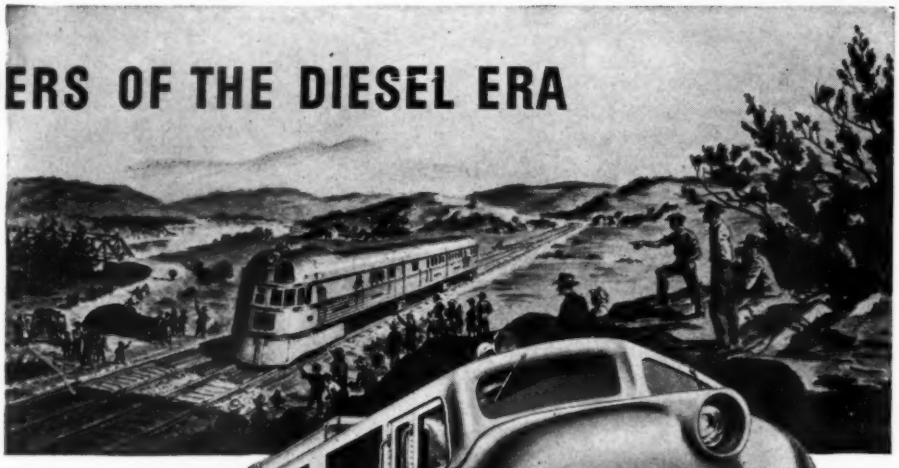
COMPRESSORS • TURBO BLOWERS • ROCK DRILLS • AIR TOOLS • OIL AND GAS ENGINES • CONDENSERS • CENTRIFUGAL PUMPS

PATHFINDERS OF THE DIESEL ERA



The original Burlington Zephyr which inaugurated a new era in American transportation history in 1934. After more than 1,650,000 miles it still is assigned to its daily round trip of 465 miles between Lincoln and McCook, Nebraska.

Latest of the illustrious descendants of the original Zephyr—one of the sixteen 5400-horsepower General Motors Freight Locomotives being put into wartime service by the Burlington Lines.

IT is just ten years since the famous Burlington Zephyr introduced new ideas in railroad travel. It was the world's first Diesel-powered streamlined train. Its power plant was General Motors Diesel. Today hundreds of General Motors Diesel Locomotives are hauling passengers and freight on 75 American railroads. They operate many millions of miles annually with astounding dependability and economy. Day by day additional GM Locomotives are entering that honored field of more than one million miles of operation. Every day brings new records of performance. And this performance, highlighted by its invaluable contribution to the astonishing war record of the railroads, is providing a glimpse of the greater day of railroading which lies ahead.

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EXCAVATING ENGINEER

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LOWER COSTS FOR DIGGING and CONVEYING

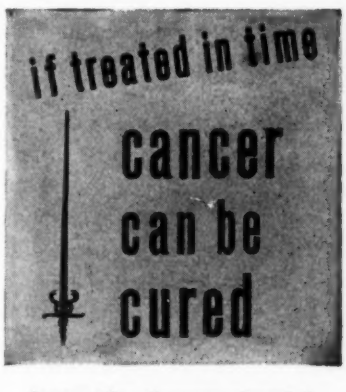
Moving Blasted Rock to Plant

WHERE loose materials (such as sand, gravel, blasted rock, ore, etc.) must be dug, hauled, and dumped at ranges from 100 to 1500 ft. the economical way to do it is with a Sauerman Scraper or Slackline Cableway.

First cost of a SAUERMAN machine is reasonable, maintenance expense is small, and the simplicity of operation permits easy one-man control of even the largest installation.

Write for Catalog.

SAUERMAN BROS., INC.
574 S. Clinton St., Chicago, Illinois



Learn the danger signals! Get early diagnosis and prompt treatment. Delay is dangerous! Enlist as a Volunteer in the Women's Field Army of your State and support its activities for Cancer Control.

If you are a resident of the Metropolitan area of New York, write the NEW YORK CITY CANCER COMMITTEE, 130 East 66th Street, New York 21, N.Y.

AMERICAN SOCIETY FOR THE CONTROL OF CANCER
250 MADISON AVENUE, N. Y. 17, N. Y.

Are you properly emphasizing the SAVINGS FEATURE OF YOUR PLANT'S PAYROLL SAVINGS PLAN?

WITH the war swinging into its tensest phase, now's the time to emphasize over and over again the *savings* feature of your Payroll Savings Plan. To press home to all your people the need of building up their savings—the need of building up their savings not only in wartime but also in the years directly after the war. To point out that a bond cashed before its full maturity is a bond killed before it has given its fullest service to its owner—*or to his country!*

Buying War Bonds, holding War Bonds, and keeping wartime savings mounting—all are absolutely vital. But no one of these is enough by itself. The *savings habit* must be carried over into the years of reconstruction which will follow the war. For if, at war's end, we have 'flash-in-the-pan' spending, *everybody loses.* The spender loses, you lose, and the country loses! While a working public, convinced of the value of continued, planned saving, is the soundest possible foundation for private enterprise of every sort.

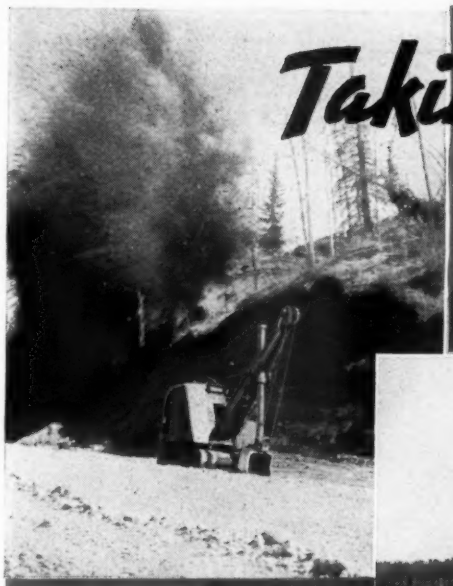
We call these bonds War Bonds—and with their aid we will win this war at the earliest possible moment! But they're Peace Bonds, too—and, rightly used, they will win for their holders, *and for all of us,* a happy and prosperous place in the years of peace to come. WAR BONDS to Have and to Hold.

The Treasury Department acknowledges with appreciation the publication of this message by

Excavating Engineer

★ Let's All Back
★ the Attack...
★ with War Bonds!

This is an official U. S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council



Taking the KINKS out of the ALASKA HIGHWAY

with

BUCKEYE CLIPPERS

When the Alaska Highway was originally built, "Hurry" was the slogan. Engineers laid it out along the natural contours of the land—the line of least resistance—to rush the military roadway to completion.

Today with less need for haste, the highway is being streamlined. Hills are being cut away, depressions filled in and curves straightened. It will be 107 miles shorter. On this job, as on the construction of the original highway, Buckeye Clipper convertible shovels are playing important roles.

The success of Buckeye Clippers on this job is evidence of what they can do for you on peace time projects. Under the most severe weather conditions, with little maintenance available, they came through handily. Because of their intelligent design, rugged construction and ease of operation due to "Mevac" finger-tip control, these shovels have made an enviable reputation for greater yardages with less effort.

For post-war operations, write for Buckeye Clipper Bulletin 543. It will show you why Buckeye Clippers should be your choice among ½ and ¾ yard power shovels.

BUCKEYE TRACTION DITCHER CO., Findlay, Ohio

THEY USED TO SET TYPE BY HAND

But now practically all type is rapidly set by machines, making books, newspapers and magazines available in tremendous volumes at low cost. All operations of the Buckeye Clipper are controlled by Mevac vacuum power—the faster, easier and smoother way to run a power shovel or crane. Mevac speeds excavating and material handling as the linotype speeds typesetting.

Built by Buckeye

See Page 213

Convertible Shovels Road Wideners Trenchers
Spreaders R-B Power Finegraders Tractor Equipment

EVEN TIGER BRAND NEEDS IT!

Add life to your wire ropes with LUBRICATION

One of the most frequent causes of premature wire rope failure is lack of proper lubrication. Yet lubrication is such a simple means of extending rope life that it seems incredible that rope users should overlook it. But they do.

Every American Tiger Brand Wire Rope comes to you from the factory, properly lubricated and ready for service. But factory lubrication, no matter how efficient, will not last the life of the rope. Field lubrication at regular intervals is absolutely essential. Wire rope is a machine, composed of many working parts. It requires periodic lubrication to reduce frictional wear.

Use a well-tested lubricant like Tiger-Lube which has been developed through years of study and research. Be sure that the rope surface is clean and that the lubricant is applied uniformly and thoroughly.

Lubrication is insurance against corrosion and is the safest way to prevent excessive internal and external rope wear. Lubrication will materially assist in controlling the wear on sheaves and drums and in prolonging rope life, resulting in increased operating efficiency.

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York

COLUMBIA STEEL COMPANY
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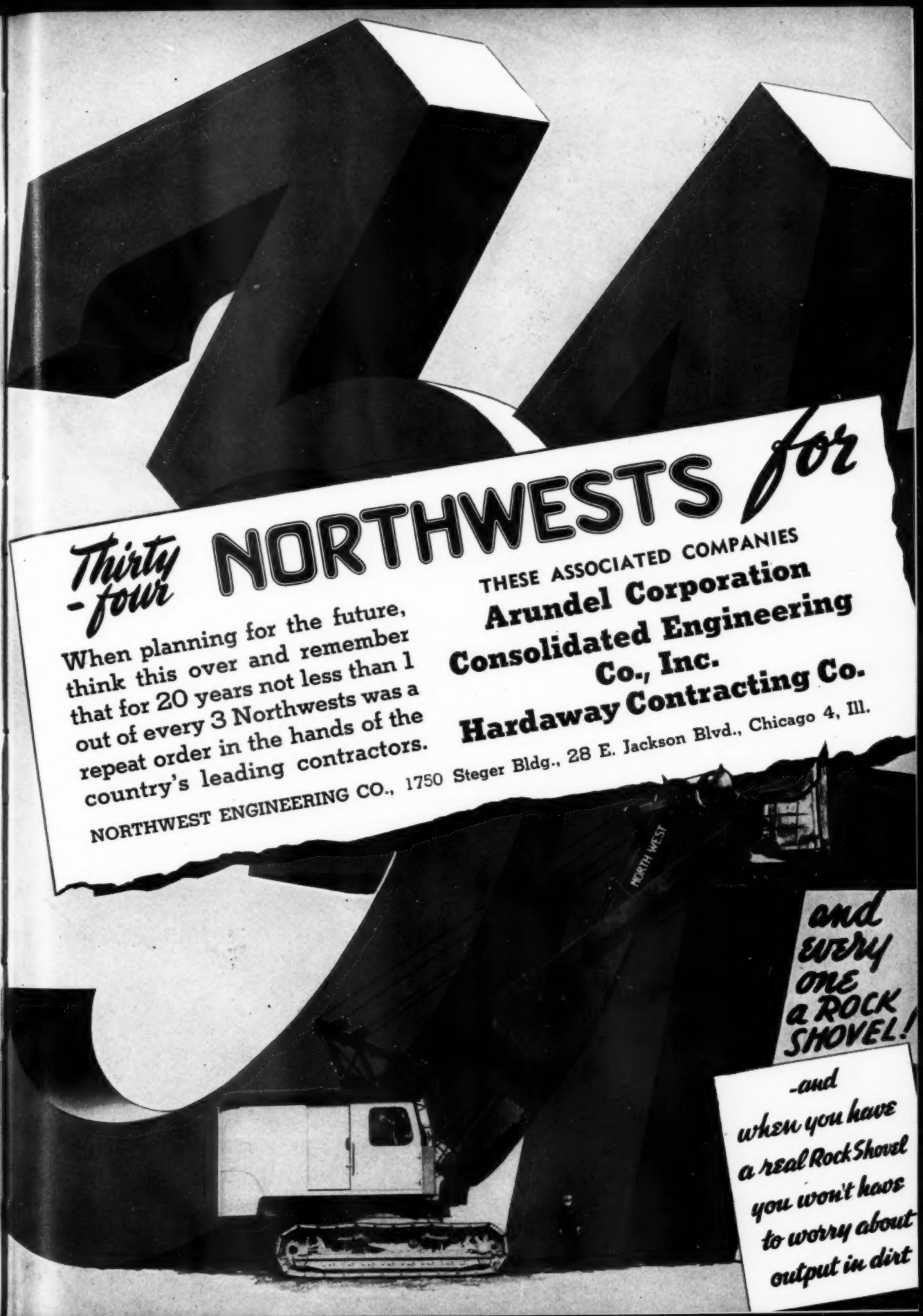
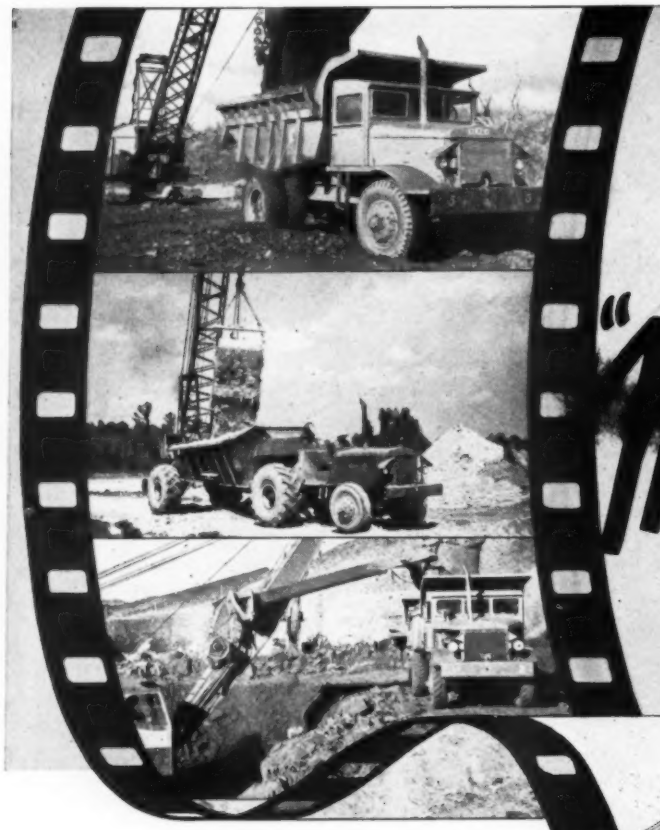
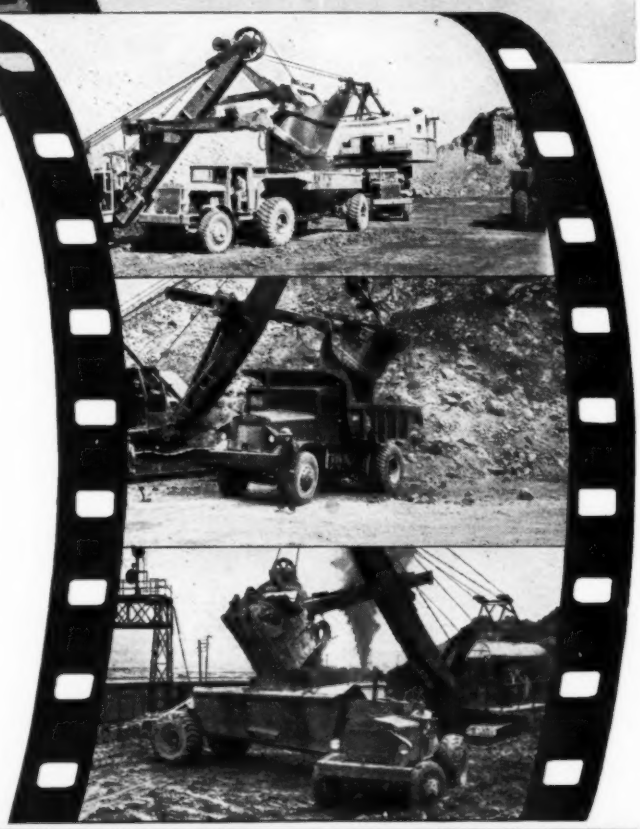
Excellay Preformed

UNITED STATES STEEL


Thirty-four NORTHWESTS for
When planning for the future, think this over and remember that for 20 years not less than 1 out of every 3 Northwests was a repeat order in the hands of the country's leading contractors.
THESE ASSOCIATED COMPANIES
Arundel Corporation
Consolidated Engineering Co., Inc.
Hardaway Contracting Co.
NORTHWEST ENGINEERING CO., 1750 Steger Bldg., 28 E. Jackson Blvd., Chicago 4, Ill.
NORTH WEST
and every one a ROCK SHOVEL!
-and when you have a real Rock Shovel you won't have to worry about output in dirt



EUCLIDS ARE "Made to Order" FOR TOUGH HAULING JOBS



● Hauling payloads of 15 to 30 tons over difficult off-the-highway hauls is the job for which Rear Dump and Bottom-Dump EUCLIDS are designed and built. Overburden and ore hauling in open pit mines, construction of roads, dams, levees, airports and military installations—these are the types of jobs on which Euclids have proved their efficiency and versatility.

For your present and future hauling equipment requirements, check Euclid job-proved performance for low hauling costs. Your Euclid distributor or representative will be glad to supply helpful facts and figures.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

EUCLID SELF-POWERED HAULING EQUIPMENT
For EARTH . ROCK . COAL . ORE

You can't take one away from the other—the Steel, the Rope, the Men who make it, engineer it, and apply it to the drums and sheaves. They add up to rope service ● **ROEBLING** *"Blue Center"* **STEEL WIRE ROPE**

WHAT CAN YOU EXPECT from Roebling? Rope that has known capacity to deliver service. Engineering, in our plant and at your job, to put the rope to work right. Maintenance practices that protect its long life. » » Your postwar profits and postwar jobs will depend in part on operating rope-rigged equipment at lowest cost. You can leave that part to Roebling.

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Branches and Warehouses in Principal Cities

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PACEMAKER IN WIRE PRODUCTS

WIRE ROPE AND STRAND • FITTINGS • AERIAL WIRE ROPE SYSTEMS • COLD ROLLED STRIP • HIGH AND LOW CARBON ACID AND BASIC OPEN HEARTH STEELS • ROUND AND SHAPED WIRE • ELECTRICAL WIRES AND CABLES • WIRE CLOTH AND NETTING AIRCORD, SWAGED TERMINALS AND ASSEMBLIES • SUSPENSION BRIDGES AND CABLES

It's Tragic To Let A Motor Truck Work Without A Trailer

Fruehauf Carry-All Trailers, in various designs and with capacities up to 50 tons, are widely used in construction work and for carrying machinery and other heavy loads. Other models are especially adapted for the hauling of sheet and fabricated steel, stone, cement, pipe and other engineering and construction loads.

IT'S wasteful at any time . . but in wartime, when there is a shortage of rubber, steel, gasoline and oil . . *it's tragic to let a motor truck work without a Trailer!*

The war has created shortages of hauling equipment, and of the materials of which the equipment is made. That makes it necessary to conserve materials . . and to get every possible ounce of work out of the motor trucks available to you.

How? By having your trucks work as mechanical horses and *pull* their loads on Trailers. Any motor truck, *pulling* a Trailer, can haul two to four times as big a load as it is designed to *carry*. And conversion of your trucks into "tractors" to pull Trailers is simple.

The shortage of motor trucks will probably continue long after the war, so it will be wise to make your transportation plans on a long-time basis . . and to get two, three or four times as much work from your trucks by having them pull Trailers.

Naturally, your savings in money are almost in proportion to the extra work your trucks accomplish.

FRUEHAUF TRAILER CO. • DETROIT

World's Largest Builders of Truck-Trailers

Service in Principal Cities

FRUEHAUF TRAILERS

"ENGINEERED TRANSPORTATION" REG. U.S. PAT. OFF.

...in Peacetime and Wartime—

POWERFUL Trailbuilders and Bulldozers

BONDS SPEED VICTORY

These rugged GW Units are now doing such a vital job for our Armed Forces in this Wartime. GW Units will again take their place in Peacetime, after having distinguished themselves for their outstanding performance.

ALSO

2-wheel Hydraulic Scrapers • Hydraulic Rippers
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GW ROAD MACHINERY is Sold Through ALLIS-CHALMERS Dealers Everywhere

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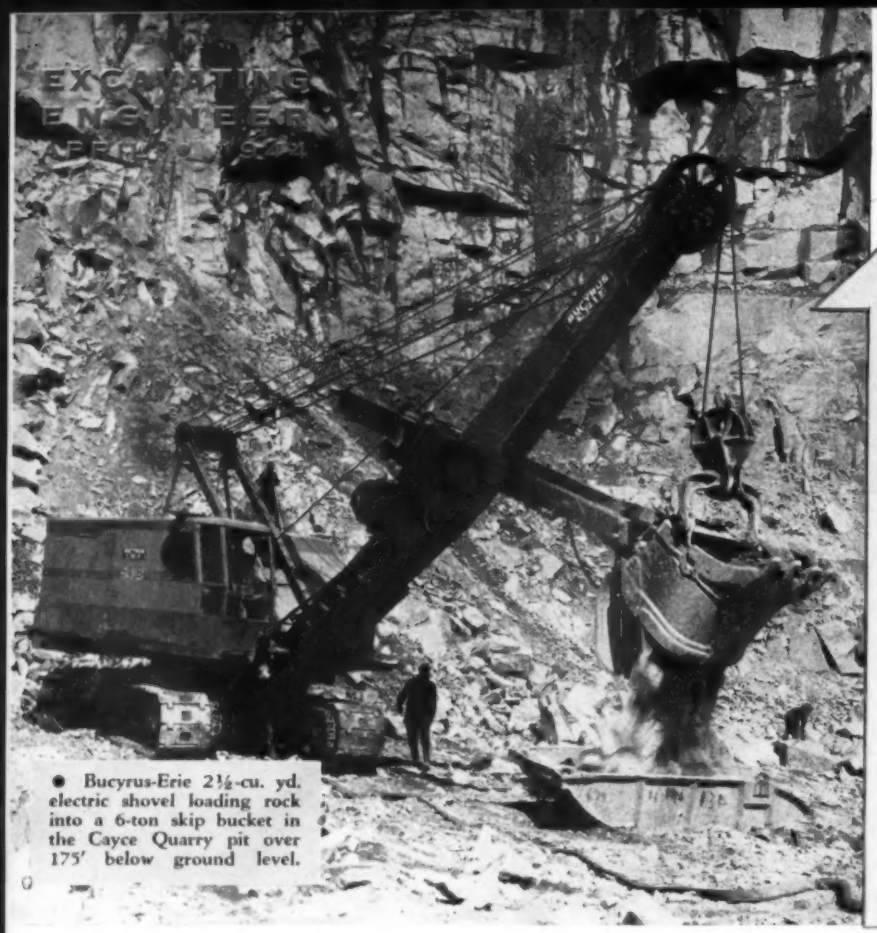


• Bucyrus-Erie 2½-cu. yd. electric shovel loading rock into a 6-ton skip bucket in the Cayce Quarry pit over 175′ below ground level.

The Only Way Out is UP

Operation of The Weston & Brooker Company's deep rock quarry at Cayce, South Carolina, presents some interesting solutions to the problems of moving rock from shovel to crusher via an aerial haulage system.

By SPENCER JONES

HOW would you like to try to make a profit out of a crushed stone operation if the quarry were 175′ to 200′ deep, with skip buckets on cableways the only means of transportation from shovels to crusher? Just how would you go about blowing down a 200-foot face of hard, tough granite with a minimum of secondary blasting? How would you handle, with safety, any drilling or removal of loose rock halfway up the quarry face? What size skip buckets would you use and what size and type of primary crusher should they feed? What sort of crushing and sizing plant would you install?

These are some of the questions that The Weston & Brooker Company, of Columbia, South Carolina, has had to answer in the operation of its quarry and crushing plant at Cayce, South Carolina. Here, across the Congaree River from and slightly south of Columbia, is what is probably one of the deepest crushed granite quarries in America. It wasn't designed originally to be 175′ to 200′ deep, but because of land ownership and other unavoidable conditions, the workings reached their present exceptional depth.

Aerial Hauling Roads

There are no roads, stairs or even ladders down into the 14-acre quarry floor. Skip buckets provide the only means of access, and a first class thrill for the adventurous visitor who is lucky enough to get a ride in one of the buckets from the primary crusher, out over the big hole and down beside one of the shovels. How did the shovels get down there? The same way. They were lowered piece by piece and assembled down below.

Like most other quarry operators, The Weston & Brooker Company has to remove a lot of overburden before it can start to work on the solid rock. At Cayce there is a 20-foot to 30-foot thickness of earth, clay and decomposed rock overlying the granite. Various methods of removing overburden have been used at different times. At present The Weston & Brooker Company has the rough, or primary stripping of overburden done by other parties on a contract basis, usually in quantities of 60,000 cubic yards, more or less. Final, or secondary stripping is done by the quarry's men, who use a Bucyrus-Erie 20-B electric shovel, loading into Ford trucks with a ¾-cu. yd. dipper. All overburden from primary and secondary stripping is hauled to and dumped on the extreme edge of the property where a portion of it is used in building a dike around a settling basin for wash water from the crushing and cleaning plant. The dike and other dumped overburden is rough graded with a LaPlant-Choate bulldozer on an R4 Caterpillar tractor. When the 20-B shovel is needed for other work around the plant, such as excavating a cut for the railroad siding, it is taken off the stripping, but only for short periods, as secondary removal of overburden is carried on as continuously as possible.

So here we are with the overburden cleaned off the rock over a considerable area at the top of a quarry face that is, say, 187 feet high. The granite is hard, tough and seamy; it

weighs about 4,250 lbs. per cubic yard in the solid. We must blow that face away completely down to the level of the quarry floor in such a well-shattered condition that most of it can be fed directly to the primary crusher, holding secondary blasting down to a minimum. The blast must be so planned that no flying rocks will damage the two cableways which extend across the quarry.

The Weston & Brooker Company's executives, with all of their experience (or probably because of all of their experience), call in explosives engineers and put the problems involved in each blast up to them, and follow their recommendations. No two blasts are quite alike, but over the years a more or less uniform technique of drilling and blasting has been developed.

Blast Hole Drilling Operations

Drilling at Cayce quarry includes deep well-drill blast holes and shallower wagon-drill holes. The well-drill holes are 6" in diameter, pounded down by Keystone well drills to three feet below the level of the quarry floor. It takes about 225 hours of drilling, bit changing, bailing, etc., for each six-inch blast hole, so it is easy to understand why The Weston & Brooker Company executives do a lot of thinking and planning before they start drilling.

The wagon-drill holes are sunk by Ingersoll-Rand wagon drills to a depth of 25 feet, starting at 2½" diameter and bottoming at 1¾" diameter. One wagon-drill hole is spotted halfway between each two well-drill holes, and in line with them. Another row of wagon drill holes is staggered half way between the row of wagon-and-well-drill holes and the face of the quarry. All wagon-drill holes are drilled wet.

Well-drill bits are resharpened on an Armstrong bit sharpener after making four feet of hole at the rate of one foot per hour. Wagon-drill steel is resharpened on an Ingersoll-Rand IR-50 bit sharpener after making five feet of hole at the rate of 15 feet per hour.

Electrically driven Ingersoll-Rand and Worthington compressors furnish air at 100 lbs. pressure for the wagon drills, numerous jackhammers and other pneumatic tools.

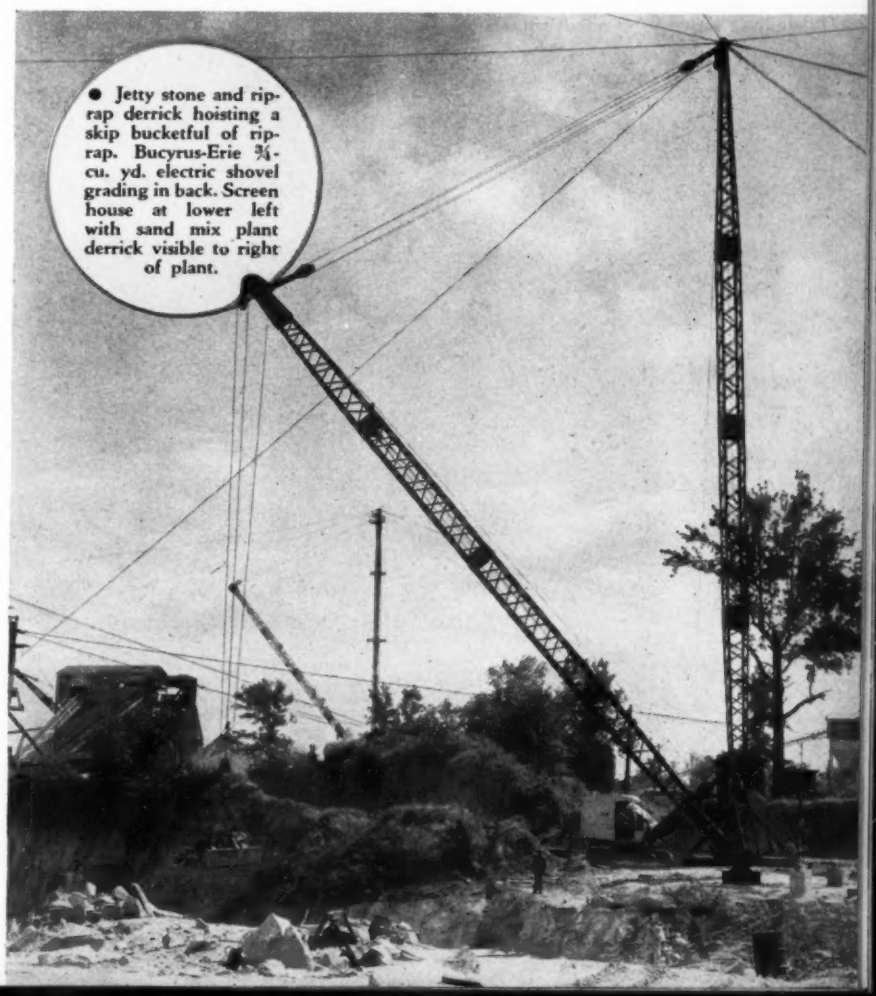
The well-drill holes are loaded with about 400 lbs. of 75% gelatin followed by about 900 lbs. of 60% gelatin. Above this comes 10 feet of stemming, two 5¼" x 24" cartridges of 50% gelatin, then stemming to the surface. Wagon-drill holes are loaded with 15 to 20 lbs. of 50% and 60% gelatin, followed by eight feet of stemming to the surface. Primacord is used in all well-drill and wagon-drill holes. Hook-up is in series, a maximum of three well-drill and six wagon-drill holes being fired at one time with No. 6 blasting caps and a blasting battery. About 4½ tons of rock are brought down per pound of explosive used in primary blasting.

Never having met a quarry operator who was certain that the fragmentation produced by his primary blasting was satisfactory, it is no surprise to learn that The Weston & Brooker Company executives wish they didn't have so much secondary blasting to do. Actually, their primary blasting produces an excellent percentage of well-shattered rock acceptable by the primary crusher. The company occasionally ships a small volume of rip-rap on miscellaneous order. In the past, the company has handled a large number of jetty jobs, both primary installation in South Carolina, Georgia and Florida coasts and then smaller orders for jetty repairs. Jetty stone has hitherto been handled by 20-ton derricks.

Rocks too big for the primary crusher are drilled with jackhammers and shot with 60% dynamite, touched off with short fuses.

"Dinny", a Handy Rig

Before leaving the subject of drilling and blasting, special mention should be made of "Dinny". When you are blowing down a 175' to 200' quarry face, the break is not always clean. Due to the cussedness of inanimate things there are sometimes ledges, pinnacles, promontories and plain ordinary blocks of rock apt to be left, high up on the quarry face, poised to flop down and likely to injure men and equipment. And that's where "Dinny" comes in. "Dinny" is a portable, counterweighted boom on pneumatic tires, equipped with an electric hoist, a set of sheaves at the outer end of the boom, and a travelling set of sheaves rolling on tracks which are attached to the underside of the boom. This rig has two axles and four wheels, with brakes on the front wheels, and is towed about by its short tail and spotted in the desired positions by a tractor. "Dinny" is about 73 feet long overall; 48 feet from front axle to the hook under the sheave at the end of the boom; 23½ feet from axle to axle. Counterweight rests over the rear axle. "Dinny" received its name because of a marked resemblance to those cute little reptiles known as dinosaurs that



● Jetty stone and rip-rap derrick hoisting a skip bucketful of rip-rap. Bucyrus-Erie ¾-cu. yd. electric shovel grading in back. Screen house at lower left with sand mix plant derrick visible to right of plant.

rambled over the earth many years ago.

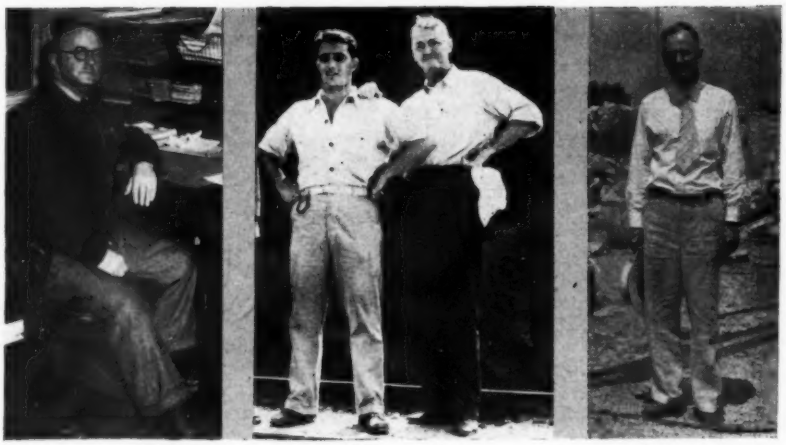
"Dinny's" job is to lower, raise and hold men, wagon drills, jackhammers and drill steel when there is work to be done on ledges and other rocky protrusions high up on the quarry face. Invented by W. S. Weston, company president, the rig was built in the company's shops and can handle a load of 1,500 lbs. dangling from the tip of its nose. Some reptile!

Now that we've got the quarry face blown down, all we have to do is get the shattered rock off the quarry floor, out of the hole and into the crushing and sizing plant. Down on the quarry floor are a Model 471 Marion shovel with a 1¾-cu. yd. dipper, and a Bucyrus-Erie 54-B shovel with a 2½-cu. yd. dipper, loading rock into 6-ton skip buckets. Both shovels are electrically operated with 550-volt alternating current.

The skip buckets are transported on two Lambert aerial cableways. Both cableways extend completely across the quarry, with the pivot ends at the primary crusher as a center, and are supported at their outer ends on movable towers which roll on circular tracks. The southerly cableway, called No. 1, has 600 feet of track, and the northerly cableway, No. 2, has 900 feet. The curve of the tracks, of course, has the fixed end of the cableways at the crusher for a center.

Both main cables are 2¼" 91-wire of American Steel & Wire Company manufacture. Both have ¾" two-part hoist lines and ¾" two-part dump lines. No. 2 cableway has a preformed IWRC hoist line to offset conditions due to over-wind on the hoist drum. Each cableway delivers from 15 to 22 skip buckets of rock to the primary crusher per hour.

● Marion 1¾-cu. yd. electric shovel also loads stone to skip buckets in quarry pit.



● Left: A. K. Rucker, superintendent of Cayce Quarry. Center: left, W. S. Weston, Jr., now an army officer, assistant superintendent, and W. S. Weston, president of Weston & Brooker Co. Right: W. L. Blackwell, manager of all operations.

Crushing the Quarry Stone

Now we've got the rock up out of the hole, so let's start making little ones out of the big ones. Here comes a skip bucket as we stand back of the 27" Kennedy-Van Saun gyratory primary crusher. The brake holds the dump line and the load line slackens and lowers the open end of the skip, allowing rock to slip onto the "Dump" or slide leading into crusher. A conventional 25-ton stiff-leg derrick and rock hook is used for breaking cribs.

The chewed-up rock from the primary crusher falls onto chain bucket elevator No. 1, which hoists it up and dumps it into a surge bin. The surge bin discharges onto a rubber belt feeder, over which a big electro-magnet is suspended to remove tramp iron. Up the rubber belt go the rock fragments to a 5½-foot Symons cone crusher. After being chewed still smaller, the stones fall into another chain bucket elevator, No. 2, which carries them to an F-800 5' x 14' W. S. Tyler double-deck vibrating screen.

The sizes of the apertures in the screens of the two decks vary with the demand for different sizes of stone. At the time of our visit the upper deck had 2¼" hexagonal holes and the lower deck had 1¼" hexagonal holes. Stones scalped off the upper deck are carried on a 30" rubber belt conveyor "A" with Link-Belt idlers, pulleys, etc., to a three-foot Symons cone crusher for further size reduction, after which they fall into No. 2 chain bucket conveyor and take another jiggling ride through

● Movable tower of No. 1 cableway that has 600 ft. of track.

the F-800 W. S. Tyler vibrating screen.

Material passing through the 2¼" hexagonal holes in the upper deck of this vibrating screen is carried on a 24" rubber belt conveyor "N" with Link-Belt idlers, pulleys, etc., to the screen house, where it is re-screened in company with material scalped off the upper deck of another vibrating screen. Material passing through both the upper and lower decks of the F-800 W. S. Tyler vibrating screen, previously mentioned, is carried on still another 24" rubber belt conveyor "M", which has both Robbins and Link-Belt idlers, pulleys, etc., to a 6' x 12' double-deck Buffalo-Niagara Mogul vibrating screen.

Material scalped off the upper deck of this screen, that is, refusing to pass through the 9/16" perforations which were being used at the time of our visit, is mixed with the material rejected by the lower deck of the W. S. Tyler screen and is re-screened on a 4' x 10' Style B Allis-Chalmers double-deck vibrating screen.

The lower deck of the Buffalo-Niagara Mogul vibrating screen has ⅛" round perforations for the first ⅔ of its length, and ⅜" hexagonal perforations for the last ⅓ at the discharge end. Material rejected by both the ⅛" and ⅜" screens goes to the finished product bin as ⅝" stone. Material rejected by the ⅛" screen, but passing through the ⅜" screen, goes to another finished product bin as ⅜" stone. Material passing through the ⅛" screen is chuted to a sand drag, designed and built by The Weston & Brooker Company, from which it is again chuted to still another finished product bin as washed rock sand.

Variety of Sizes Produced

So far we have, as finished products, jetty stone, rip-rap, ⅝" stone, ⅜" stone and rock sand. How about the larger sizes of crushed stone? That's our reminder about the 4' x 10' Style B Allis-Chalmers double-deck vibrating screen that re-screens the mixture of material rejected by the lower 1¼" holes of the W. S. Tyler vibrating screen and that which was scalped off the 9/16" holes of the upper deck of the Buffalo-Niagara Mogul screen. This mixture is chuted to the upper deck of the Allis-Chalmers vibrating screen, which has 1¼" hexagonal perforations. Material scalped off this upper deck is called 2" stone and is chuted to a finished product bin. Material passing through the upper deck, but rejected by the lower deck, with its ¾" hexagonal perforations, is called 1¼" stone and is chuted to still another finished product bin. Material passing through both upper and lower decks is called ¾" stone and goes to its finished product bin. These operations add 2", 1¼", and ¾" stone to the company's finished product list.

There are still more finished products to mention, and that is The Weston & Brooker Company's special sands. Although there isn't the demand for a wide variety of sizes of sand from the Cayce quarry, there is

● Belt conveyors "A", "M" and "N" running up to screen house. No. 1 cableway stationary tower in background with No. 2 cableway tower below it to the left. The stiff leg derrick that serves the primary crusher is visible in front of the taller tower of No. 1 cableway. Primary crusher is below the intersection of the two suspension cables and secondary and tertiary crushing equipment to the right.

● Below: Revolving storage crane with 2½-cu. yd. clamshell bucket. LaPlant-Choate bulldozer and R4 Caterpillar tractor under crane boom cleaning up around stone storage pile. Screen house of crushing plant in background. Right: Chain bucket elevator No. 1, surge bin and housing enclosing plate grizzley, magnet for removing tramp iron, rubber belt feeder and 5½-ft. Symons cone crusher. Mast and bull wheel of derrick that serves primary crusher in left foreground.

● Housing around sand mixer and bin for truck delivery of mixed sand and sand and stone in left foreground. Derrick for stock piling sand from sand bin and feeding sand mixing plant is in center. Screen house is visible behind sand derrick and revolving storage crane can be seen behind belt conveyor of sand mix plant.

a considerable demand for sand mixes and stone and sand mixes for plastering, mortar and ready-mixed concrete work. This is rather fortunate because about 15% of the crushing plant's output is sand.

The mixing process starts with the sand which has passed through the ⅛" mesh bottom perforations of the Buffalo-Niagara Mogul vibrating screen and has been stored in the rock sand bin. The limited capacity of the bin makes it necessary to stock pile much of this sand, so a 10-ton guyed derrick with a 1½-cu. yd. clamshell bucket transfers sand from bin to stock pile and from stock pile to the feed hopper of a sand mixing plant. The same derrick also has stock piles of bank sand and various sizes of stone within reach, which material is transferred from respective stock piles to another feed hopper of the sand mixing plant. Beneath the two feed hoppers there are inter-connected, automatic, chain-driven feeds which deliver accurately controlled quantities of rock sand, bank sand or stone to an 18" rubber belt conveyor with Link-Belt idlers, pulleys, etc. This conveyor elevates and conveys the mixture of rock sand and bank sand, or of rock sand and stone, to a paddle type mixer, somewhat like a pug mill. Material discharged from the mixer can be chuted either directly to freight cars or to a storage hopper from which trucks can be loaded.

Limited bin capacity also makes stock piling of stone necessary, since the plant stone production capacity is in the neighborhood of 300 tons per hour. For this stone stock piling, the executives of The Weston & Brooker Company designed and built a revolving storage crane which is equipped with a 2½-cu. yd. clamshell bucket. Surrounded by ample storage space, the revolving storage crane probably can stock pile 60,000 tons of stone, and the storage capacity can be easily extended by bulldozing with the company's LaPlant-Choate bulldozer and R4 Caterpillar tractor. This bulldozing equipment is frequently called away from its work on rough

(Continued on page 218)

● Sump, pump and discharge line for removal of seepage and rain water in Cayce Quarry.

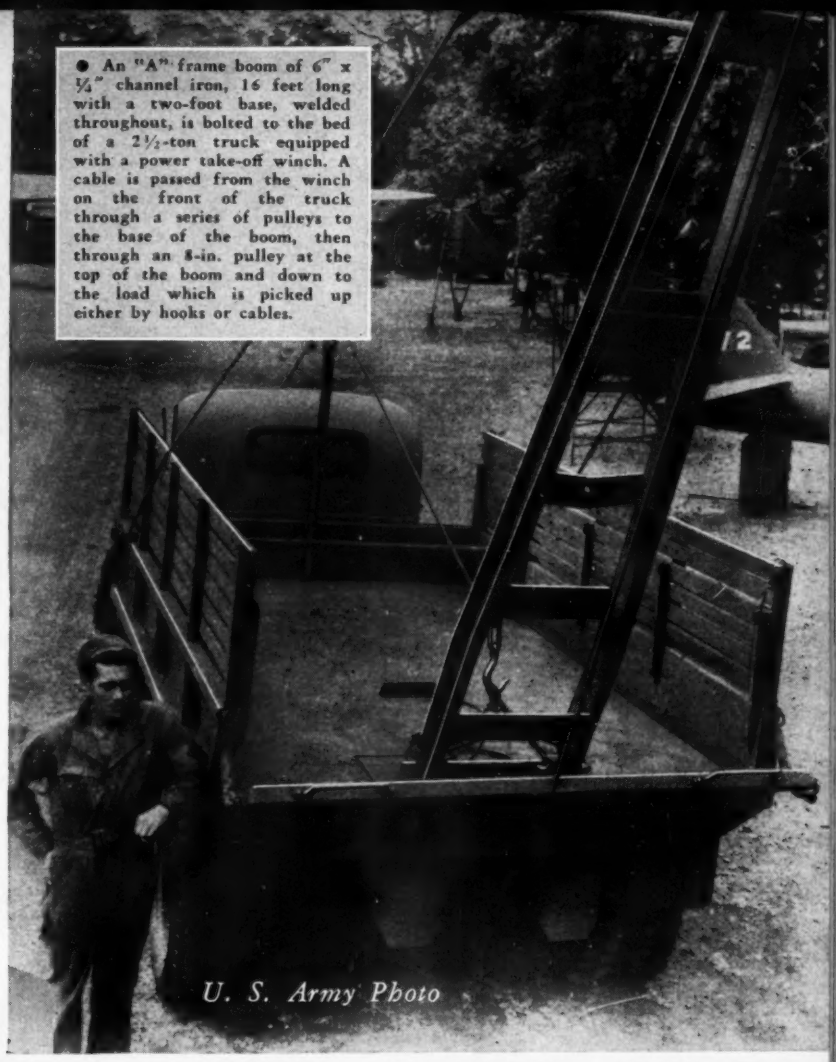
● F-800 W. S. Tyler vibrating screen to right, chain bucket elevator in center, and rubber belt conveyor to 3-ft. Symons cone crusher at left.

G. I. Ingenuity Creates Crane

The temporary lack of a standard Army C-2 wrecker on a South Pacific island did not faze members of the Service Squadron Engineering Section, Air Service Group, 13th Army Air Force — they used their good American ingenuity and from a meager collection of salvaged material made their own crane, called a C3-1B.

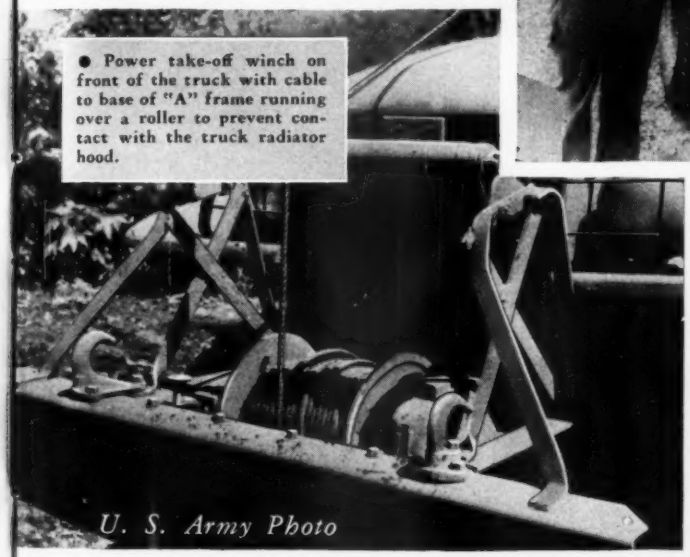
The name "C3-1B" was derived as follows: "C" indicates crane; "3" means third and latest model constructed; "1" represents the "A" frame, and "B" means second modification to the present crane.

The C3-1B can handle loads up to 4000 lbs., although for steady use it is not recommended for lifting more than 2500 lbs. It has proved especially useful for lifting B-17 wing panels, fuselages or engines and its utilization for such work frees the C-2 wrecker for heavier duty jobs. The improvised crane does not replace the C-2 but serves as a useful adjunct to it.



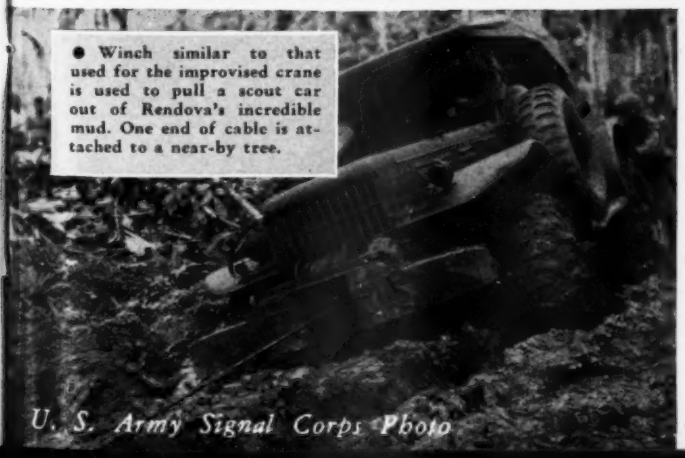
● An "A" frame boom of 6" x ¼" channel iron, 16 feet long with a two-foot base, welded throughout, is bolted to the bed of a 2½-ton truck equipped with a power take-off winch. A cable is passed from the winch on the front of the truck through a series of pulleys to the base of the boom, then through an 8-in. pulley at the top of the boom and down to the load which is picked up either by hooks or cables.

U. S. Army Photo



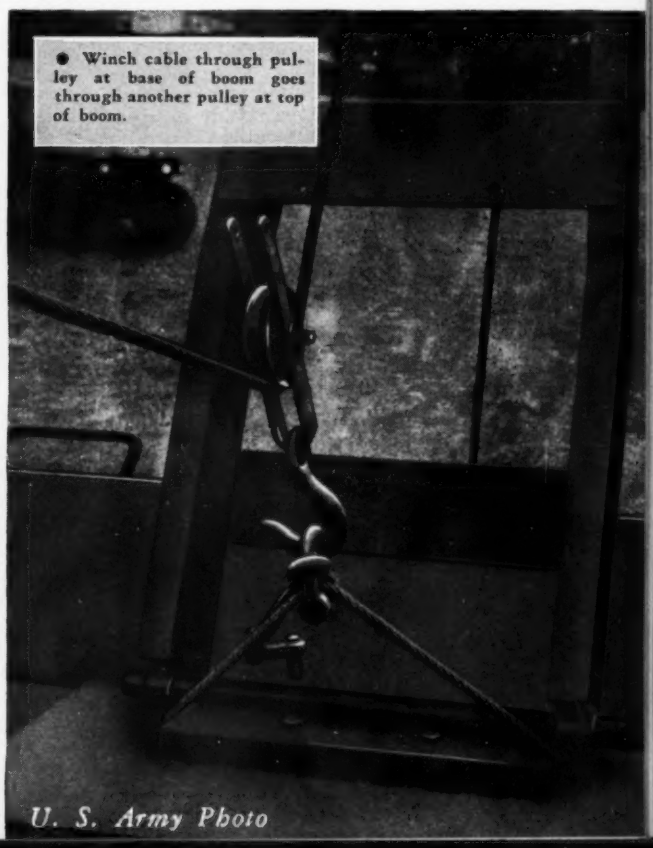
● Power take-off winch on front of the truck with cable to base of "A" frame running over a roller to prevent contact with the truck radiator hood.

U. S. Army Photo



● Winch similar to that used for the improvised crane is used to pull a scout car out of Rendova's incredible mud. One end of cable is attached to a near-by tree.

U. S. Army Signal Corps Photo



● Winch cable through pulley at base of boom goes through another pulley at top of boom.

U. S. Army Photo

● One of Aero Service Corporation's 14 special airplanes used on photographic mapping mission in South America.

Aerial topographical surveys prepared from photographs taken from flying airplanes used as a quicker, accurate method of surveying and to compute quantities of material involved in excavations and earthworks. Maps can be contoured to one foot intervals and accurately depict exact locations, distances and elevations.

By RALPH WESLEY JONES
(Member, American Society of Civil Engineers-Consultant)

Planning and Mapping—1944

POSTWAR PLANNING of activities to replace the abnormal pace of business that the war has created is a vital need recognized by public officials, private contractors, and industry. Most economists recognize the fact that public works afford the most promising outlet for the energies of a demobilizing America. It is also true that, to a major degree, it has been public works that have been postponed in the "all out" war effort.

There is no doubt about the magnitude of public works construction facing us after the war. And all too clear is the recollection of the inadequacy of improvised work relief programs, such as CWA and WPA in the catastrophic days of the early 1930's. The necessity of postwar planning is self-evident, but the chief bottleneck in this postwar planning to date has been the lack of survey and engineering personnel — that is where the service branches have hit hard — and the construction fields were also struck with telling effect to man the construction branches of our fighting forces.

● Editing of the photo index map is one of the first steps in the office work. Each individual picture bears its number, date and hour of flight.

For many who are desirous of carrying out postwar planning to the contract stage—and doing it now—there is a solution to this manpower shortage in the engineering ranks—aerial photographic surveying and mapping. And girls and women mapmakers are turning out these maps on an assembly line basis in the Aero Service Corporation plant in Philadelphia. Once again, the exclusive domain of the male, the civil engineering profession, has been invaded by the draftswoman. As a result of this female invasion we have the answer to the question of how to break the bottleneck of lack of engineering and survey personnel for carrying postwar planning from the paper stage to the contract stage.

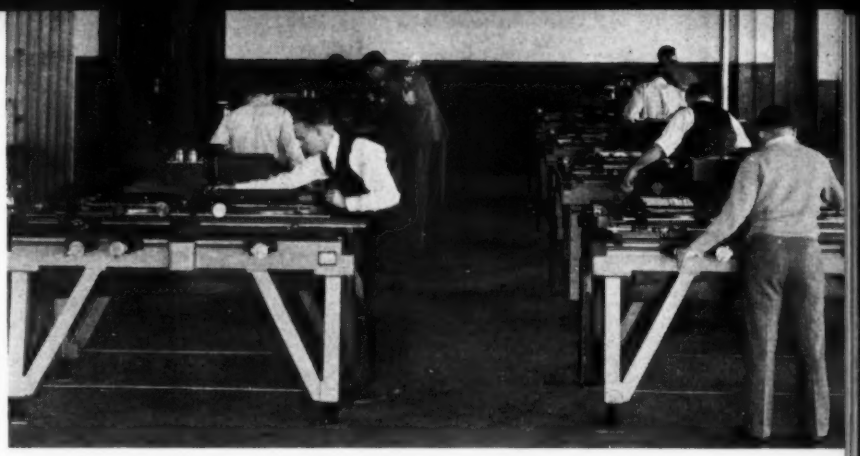
Aerial photographic contour maps were employed in connection with the construction of the San Gabriel Dam over six years ago and were given exhaustive checks against ground surveys. Boulder Dam, much of the TVA work, and other important reclamation works were contoured from precise aerial photography by the "Brock" stereoscope method. Most of us in the engineering profession rely upon the excellent maps in the U. S. Geographical Survey. They are prepared by engineers jealous of the quality of their work. Their accuracy is well understood and admitted. Then, too, many engineers and contractors have understood the detailed accuracy and thoroughness of the engineering of the U. S.

Reclamation Service and the Public Roads Administration. These, and many other branches of government, know that aerial surveys furnish more accurate results — and more quickly—than can be obtained by any other method.

Tests Prove Accuracy

Tests run by the Federal Government on an Aero Service contract showed that 94 percent of the points fell within one-half the contour interval, as compared with 90 percent accuracy required by the specification. The same "Brock" topographic maps, contoured to one foot intervals, provide accuracy for earthwork computations that have brought repeat jobs from leading engineers and industrial organizations, particularly in the recent years of war speed.

Governments employ aerial photography and surveying, as performed by Aero Service, to assure accuracy of artillery and naval gun fire. Photographs of enemy territory, taken from a swift plane five miles in the air, are corrected by photogrammetric methods to accurately depict the exact locations, distances and elevations of installations on the ground. Accuracy in bombing strategic centers of Axis-held Europe is due to the perfection of the photography obtained from increased precision of aerial cameras and photogrammetric equipment developed for peace-time surveying and mapping over the last 20 years.



● This is a battery of eight "Brock" stereoscopes used by Aero Service. The stereoscope translates two overlapping aerial pictures into "third dimension" pictures. One-foot contour maps are developed on these machines, if so desired.

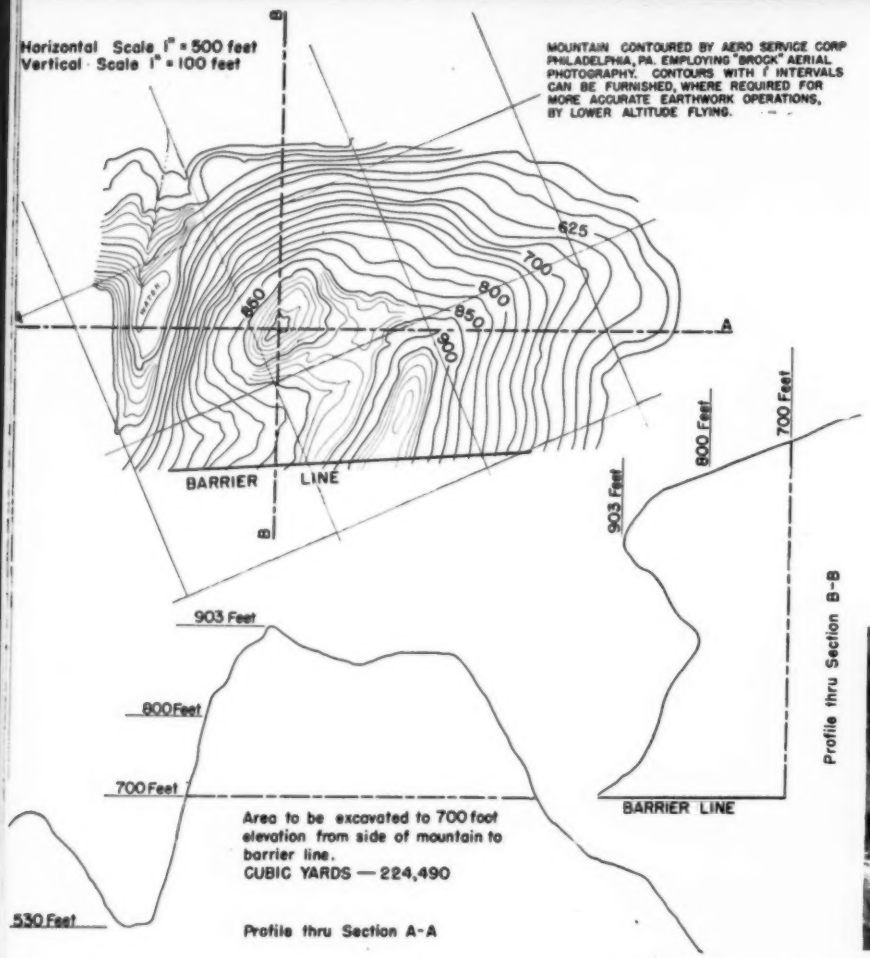
Fundamentally, there is little that is complex about aerial photographic surveys. Aerial photography is a true photographic reproduction of everything within range of the specially constructed precise camera designed and built in the Philadelphia shops of this aerial photogrammetric service from a generation of experience. From the standpoint of coverage alone, this method must be more accurate, more complete, quicker and more economical than any other method.

Skill Required

The office and laboratory work involved in mapping and surveying from aerial photography, however, entails high degrees of skill, engineering knowledge and laboratory technique—as well as rare, delicately accurate and extremely costly optical equipment. It is the function of the office organization, unhampered by bad weather which is the handicap of field parties, to coordinate the aerial photographs with a limited number of field control points obtained in the normal method of field surveying. That, primarily, changes the photograph, without scale, into a photographic map of known scale and, therefore, scaleable.

Naturally, the work involved in the various operations of converting an aerial photograph into a photographic map is not so simple as the explanation of the fundamentals involved. But all operations, mental and mechanical, are mathematically sound and largely employ geometric principles. For operations other than topographic, Aero Service Corp. employs a roll of film 9" wide x 180' long; each exposure is 9" x 9", thus giving 240 exposures per roll, snapped at intervals of perhaps 15 seconds. Each 9" x 9" exposure, depending upon camera used and height of airplane, may cover 80 square miles of ground area. Overlap in exposures is

● Below: One of four "Brock" projection cameras used for correcting "air-tilt" in the glass plate negatives. The accuracy of the work of Aero Service is aided by the use of glass photographic plates instead of film because the glass plate is less subject to variations caused by climatic conditions. Right: A Pan-American delegation visiting the Aero Service Corp. plant in Philadelphia is informed of methods used to attain straight flight lines in areas where maps are either non-existent or of very poor quality.



about 60 percent in the direction of flight, and 30 percent on the side. The area is photographed in adjacent parallel flight strips (much the same as a person would cruise up one street of a city and down the next, etc.) until the entire area is flown in one or the other of these two directions. For government contracts, all technical provisions of flying height, overlap, scale, etc., are specified. For private clients, the experience of the aerial surveying corporation is employed to produce the desired map.

Orthographic Projection

Some of the operations required are the correction of photographs from a conical projection, to an orthographic projection in which every part of the photograph appears in its true location as if obtained from a camera operating perpendicularly above each spot. Amateur photographers appreciate the distortion in the scales at various parts of a snapshot picture where one's hands may be one foot in front of the body and appear grotesquely large; think then what occurs with a picture that may cover as much as 70 square miles.

An Aero Service mosaic map covering 5,000 square miles of area may be assembled from the results of 3,500 photographic negatives. Each aerial picture is rectified, ratioed and tone-matched. Skilled technicians hold at least nine points in each print to a rigid control base. The tilt of the aerial camera, as reflected in the picture, is corrected in the office by a special rectifying camera.

Perhaps the most amazing facility of this modern surveying and mapping service is its ability to furnish, in an office that is possibly many thousands of miles from the site, correct elevations of any points in the photographs. This is "third dimensional photography," truer and swifter than can be performed by any other known method.

For Municipal Planning

It is not alone in the wilderness regions of the world that aerial surveys, photogrammetry and photography are proving their values. Planning for municipalities employs this newer, better, quicker method. The field work for traffic surveys is almost instantly made, the office work of plotting the field work is reduced greatly. By the "Brock" method of aerial surveys, in which accurate contours of the ground are made from aerial photography, computations of earthwork can be made. In Pennsylvania, for example, the amount of waste from mines and quarries can readily be revealed by these "Brock" stereoscopic-machine drawn contour maps. Sanitation engineers find troublesome areas quickly and as a result can quickly detect and eliminate mosquito breeding grounds. Removing waste banks, filling in lowlands, building levees and improving channels are but a few of the natural fields for aerial photographic surveys. For the compilation of tax maps, aerial photography is the best answer. As most taxation is based on land usage, the accurate photographic map is the best map of the actual conditions. The existence of near-by influences, beneficial or deleterious, are immediately and permanently recorded for the tax appraiser.

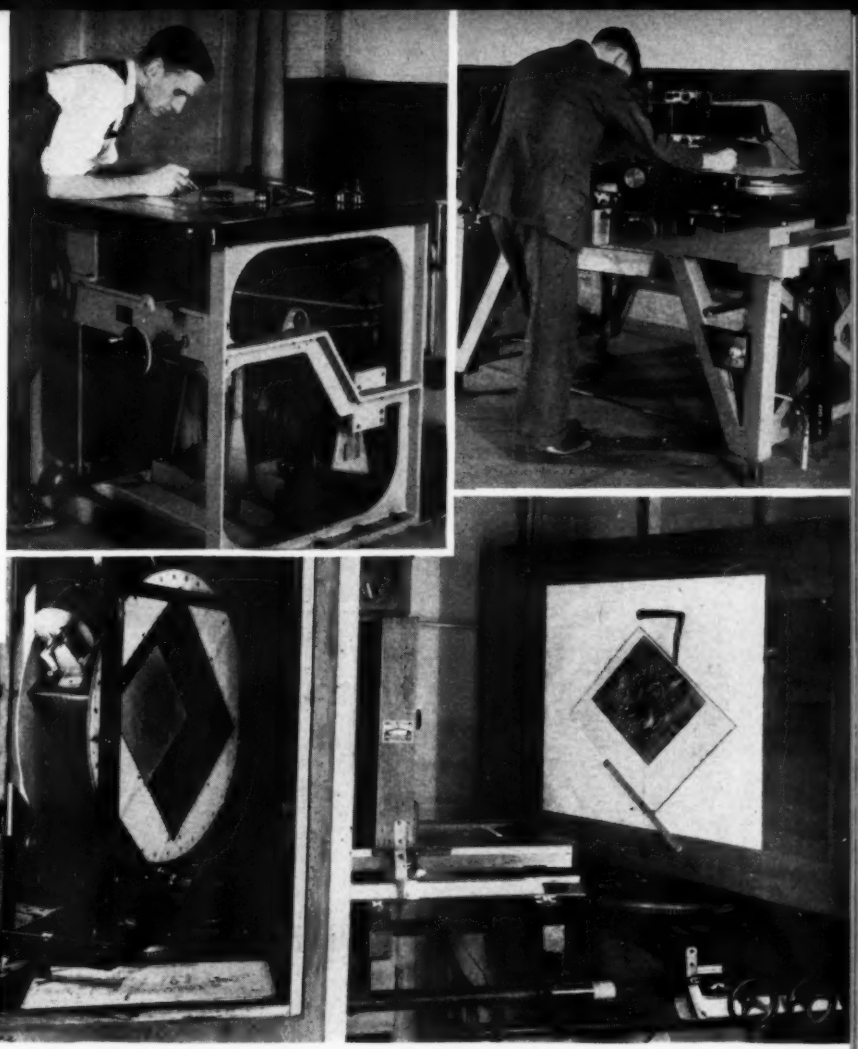
● **The contour and profile illustration to the upper left was made from a small section of the above aerial photograph.**

One of the principal users of aerial photogrammetric methods is the U. S. Department of Agriculture. Aerial photography is successfully applied to its studies for agriculture, livestock raising, irrigation, soil erosion, and forestry. Mines, quarries, sand and gravel operations, open pits, slag banks and spoil piles are logical

for the use of aerial maps and surveys—especially the "Brock" contoured topographical maps. Many of these operations cover large areas and realize a genuine economy by aerial photographic mapping. These maps provide an accurate drawing for correctly computing the quantities of materials involved in any open pit mine. For underground mines, topographic maps of the surface of the ground, with all the exterior workings shown, can be furnished complete with all natural cultural features (vegetation, streams, etc.) and underground operations indicated in proper location.

Methods Used for Years

Engineers in many branches of government service have adopted these aerial photographic methods and have been employing them for many years. It is felt that their fuller use by architects, engineers, appraisers, explorers, archaeologists, geologists, economists, lawyers, contractors, etc., will render the work of these groups more accurate. Many feel that for a sizeable construction job no set of plans should go forth for bidding unless an accurate aerial mosaic map of the site area to indicate local condition and accessibility is included. Years of litigation and arbitration, with attendant costs of hundreds of thousands of dollars, could be eliminated by precise "before and after photography," from which these contoured topographical maps would produce permanent and incontrovertible (because most of the human equation is eliminated) evidence of the work involved.



● **Upper Left: Even aerial surveying and mapping must employ certain drafting work technique. Aero Service performs a general map drafting service in addition to its aerial photography. Mapping of important areas may be of many scales made piecemeal by half a dozen agencies. Aero Service re-draws it to a common standard and scale and its projection equipment saves thousands of hours of tedious, slow scaling operations. With the tracing projecting machine shown, pictures of maps of one scale are projected, at any desired scale, onto the illuminated translucent glass table top where they are accurately traced. Upper Right: Close-up of one of the eight stereoscopes. Lower: One of the rectifying cameras for projection used to compile precise mosaic maps.**

The accuracy of "Brock" topographical contoured maps is indicated by the following specification from a contract awarded Aero Service Corp. last November by the Army Engineers for an aerial topographical survey in connection with a New England flood control project. The speed of aerial photography is indicated by the final paragraph — conventional ground surveying could not approach it:

Contract No. W-37-018-eng-24
Dated: October 23, 1943

WAR DEPARTMENT

United States Engineer Office
(Address deleted by Aero Service Corp.)
Specifications for Topographic Map

1. *Work to be done.*—The work to be done under these specifications consists in furnishing and delivering to the U. S. Engineer Office, (.....) the topographic map listed on the contract form.

2. *Description of Area to be Mapped.*—(Deleted by Aero Service Corporation)

3. *Map Detail.*—a. The horizontal scale of the map shall be 1" - 500' (1:6000) and the contour interval shall be five (5) feet. A grid system based on the State system of plane coordinates shall be used with grid lines at 2500 foot intervals drawn on the map. All horizontal and spirit leveling necessary for compilation of the map shall be completed by the contractor.

b. In all places where the ground can be

(Continued on page 218)

PUBLIC ROADS ADMINISTRATION
FEDERAL WORKS AGENCY

STATE HIGHWAY FINANCE — 1942

DISBURSEMENTS OF STATE IMPOSTS ON HIGHWAY USERS AND OTHER STATE INCOME APPLICABLE TO HIGHWAYS

Compiled for Calendar Year from Reports of State Authorities

Table SF-2, 1942
Issued October 1943

State	Collection and Administration, Highway-User Revenues	Disbursements for State-Administered Highways 1/						Expenditures and Fund Transfers for County and Local Roads and Streets 1/										Expenditures and Fund Transfers for Non-Highway Purposes	Total Disbursements	Balances on December 31, 1942	State
								For County or Local Roads			For Local City Streets			For Debt Service on Local Highway Obligations							
		Construction, Maintenance, and Administration	State Highway Police	Interest on State Highway Debt 2/	Subtotal, Current Expenditures	Retirement of State Highway Debt 3/	Total	Expenditures By State	Fund Transfers to Counties or Local Units	Total	Expenditures By State 4/	Fund Transfers To Cities 5/	Total	Expenditures By State	Fund Transfers	Total	Total				
	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	1,000 Dollars	
ALABAMA	544	11,739	677	1,538	13,954	1,910	15,864	1,661	9,020	10,681	—	374	374	—	—	—	11,055	971	28,434	3,919	ALABAMA
ARIZONA	414	4,594	177	—	4,771	—	4,771	271	1,436	1,707	—	—	—	—	—	—	1,707	—	6,892	1,260	ARIZONA
ARKANSAS	368	6,029	299	4,513	10,841	—	10,841	666	1,825	2,491	107	113	220	—	731	731	3,442	98	14,749	14,898	ARKANSAS
CALIFORNIA 1/	4,589	37,734	4,342	4,521	46,597	7,479	54,076	3,678	20,126	23,804	1,541	4,056	5,597	—	—	—	29,401	16,860	104,926	28,113	CALIFORNIA 1/
COLORADO	1,034	6,478	337	615	7,430	1,606	9,036	—	3,640	3,640	—	—	—	—	—	—	3,640	—	13,710	3,534	COLORADO
CONNECTICUT	1,153	18,269	961	357	19,587	1,628	21,215	2,757	119	2,876	—	—	—	—	—	—	2,876	—	25,244	10,328	CONNECTICUT
DELAWARE	160	1,896	260	246	2,402	346	2,748	—	—	—	—	—	—	—	—	—	—	859	3,767	—	DELAWARE
FLORIDA	1,288	11,818	535	86	12,439	328	12,767	63	8,280	8,343	—	11	11	—	356	356	8,710	13,053	35,818	7,909	FLORIDA
GEORGIA	369	10,274	790	156	11,220	2,687	13,907	1,441	3,472	4,913	—	—	—	—	—	—	4,913	4,732	23,921	−2,741	GEORGIA
IDAHO	107	4,834	149	8	4,991	109	5,100	429	2,058	2,487	—	—	—	—	—	—	2,487	—	7,694	211	IDAHO
ILLINOIS	2,184	25,965	1,869	4,439	32,273	4,971	37,244	1,444	8,105	9,549	164	9,415	9,579	—	1,395	1,395	20,523	2,974	62,925	46,976	ILLINOIS
INDIANA	1,279	19,457	1,196	—	20,653	—	20,653	573	12,200	12,773	208	3,000	3,208	—	—	—	15,981	1,763	39,676	6,225	INDIANA
IOWA	672	9,886	477	1,634	11,997	10,498	22,495	1,920	8,162	10,082	19	—	19	—	—	—	10,101	—	33,266	7,309	IOWA
KANSAS	1,344	10,011	215	84	10,310	731	11,041	106	3,600	3,706	—	—	—	—	—	—	3,706	—	16,091	9,457	KANSAS
KENTUCKY	642	16,564	435	73	17,072	900	17,972	1,759	651	2,410	—	—	—	—	—	—	2,410	841	21,865	8,175	KENTUCKY
LOUISIANA	240	13,830	783	4,448	18,981	4,762	23,743	804	—	804	9	—	9	—	—	—	813	5,662	30,458	10,092	LOUISIANA
MAINE	201	6,274	308	816	7,398	2,098	9,496	200	4	204	225	—	225	—	—	—	429	—	10,126	4,529	MAINE
MARYLAND	434	12,744	826	479	14,049	2,099	16,148	681	1,058	1,739	1,772	4,521	6,293	—	194	194	8,226	517	25,325	8,563	MARYLAND
MASSACHUSETTS	1,674	8,517	551	92	9,160	1,743	10,903	3,777	10,100	13,877	—	—	—	1,777	—	1,777	15,654	1,263	29,494	5,333	MASSACHUSETTS
MICHIGAN	2,250	30,202	598	1,332	32,132	10,282	42,414	226	29,407	29,633	—	—	—	—	—	—	29,633	—	74,297	28,145	MICHIGAN
MINNESOTA	985	16,723	484	1,100	18,307	3,792	22,099	932	5,675	6,607	165	—	165	—	—	—	6,772	89	29,945	18,507	MINNESOTA
MISSISSIPPI	455	6,475	365	1,721	8,561	2,168	10,729	—	7,918	7,918	8	—	8	—	—	—	7,926	—	19,110	5,174	MISSISSIPPI
MISSOURI	847	12,738	728	3,271	16,737	5,367	22,104	177	—	177	—	—	—	—	—	—	177	48	23,176	15,483	MISSOURI
MONTANA	108	5,036	251	55	5,342	—	5,342	—	1,254	1,254	—	48	48	—	—	—	1,302	105	6,857	3,349	MONTANA
NEBRASKA	406	6,132	212	—	6,344	—	6,344	—	4,566	4,566	—	311	311	—	—	—	4,877	2,311	13,938	2,211	NEBRASKA
NEVADA	166	3,578	—	—	3,578	—	3,578	54	—	54	—	—	—	—	—	—	54	—	3,798	1,079	NEVADA
NEW HAMPSHIRE	155	4,724	213	198	5,135	873	6,008	429	102	531	—	—	—	344	—	344	875	—	7,038	3,173	NEW HAMPSHIRE
NEW JERSEY	2,808	13,848	702	2,830	17,380	6,658	24,038	1,212	7,053	8,265	—	—	—	287	1,825	2,112	10,377	10,013	47,236	53,835	NEW JERSEY
NEW MEXICO	488	4,729	164	709	5,602	1,355	6,957	—	220	220	—	37	37	—	—	—	257	587	8,289	2,247	NEW MEXICO
NEW YORK	2,490	29,848	1,631	6,325	37,804	6,789	44,593	20	16,865	16,885	—	5,830	5,830	—	—	—	22,715	62,934	192,732	65,372	NEW YORK
NORTH CAROLINA	563	18,216	811	2,949	21,976	4,786	26,762	—	—	—	—	—	—	—	—	—	—	1,185	28,510	39,113	NORTH CAROLINA
NORTH DAKOTA	262	4,061	64	10	4,135	35	4,170	9	1,678	1,687	33	—	33	—	—	—	1,720	2	6,154	1,110	NORTH DAKOTA
OHIO	2,821	36,671	1,078	78	37,827	480	38,307	—	25,837	25,837	—	12,789	12,789	—	—	—	38,626	13,948	93,702	14,972	OHIO
OKLAHOMA	1,670	8,776	598	—	9,374	—	9,374	—	6,821	6,821	—	1,386	1,386	—	—	—	8,207	8,559	27,810	9,477	OKLAHOMA
OREGON	731	11,707	501	497	12,705	2,135	14,840	446	2,815	3,261	548	—	548	—	—	—	3,809	68	19,448	2,918	OREGON
PENNSYLVANIA	2,179	58,918	5,558	2,454	66,930	2,000	68,930	4,416	11,230	15,646	—	—	—	—	—	—	15,646	14,057	100,812	46,105	PENNSYLVANIA
RHODE ISLAND	327	2,828	221	272	3,321	513	3,834	—	41	41	—	—	—	—	—	—	41	4,054	8,256	828	RHODE ISLAND
SOUTH CAROLINA	250	9,797	561	2,340	12,698	6,085	18,784	—	2,142	2,142	—	—	—	—	—	—	2,142	542	21,718	12,667	SOUTH CAROLINA
SOUTH DAKOTA	234	3,586	78	1	3,665	—	3,665	167	1,849	2,016	4	—	4	—	—	—	2,020	59	5,978	2,011	SOUTH DAKOTA
TENNESSEE	840	8,487	383	2,642	11,512	2,102	13,614	715	6,287	7,002	365	—	365	—	—	—	7,367	7,014	28,835	19,747	TENNESSEE
TEXAS	2,697	38,309	897	4,306	43,512	7,451	50,963	4,030	12,584	16,614	—	—	—	—	—	—	16,614	13,400	83,674	23,598	TEXAS
UTAH	228	4,514	259	—	4,773	—	4,773	398	454	852	8	321	329	—	—	—	1,181	355	6,537	1,184	UTAH
VERMONT	87	2,280	106	9	2,395	91	2,486	291	1,297	1,588	—	—	—	513	—	513	2,101	5	4,679	3,531	VERMONT
VIRGINIA	704	28,799	1,103	71	29,973	—	29,973	—	412	412	—	—	—	—	—	—	412	7	31,096	10,668	VIRGINIA
WASHINGTON	804	9,406	995	219	10,620	360	10,980	622	6,056	6,678	794	2,332	3,126	99	—	99	9,903	693	22,380	15,601	WASHINGTON
WEST VIRGINIA	301	19,778	49	2,569	22,396	5,935	28,331	—	—	—	—	—	—	—	—	—	—	—	28,632	12,075	WEST VIRGINIA
WISCONSIN	1,261	12,304	—	—	12,304	3,152	15,456	400	8,829	9,229	—	1,397	1,397	—	—	—	10,626	11,940	39,283	—	WISCONSIN
WYOMING	39	3,069	99	51	3,219	—	3,219	—	610	610	—	—	—	—	—	—	610	—	3,868	2,004	WYOMING
DISTRICT OF COLUMBIA	204	—	—	—	—	—	—	—	—	—	7,294	—	7,294	—	—	—	7,294	313	7,811	2,063	DISTRICT OF COLUMBIA
TOTAL	46,056	652,452	33,816	60,114	746,382	116,305	862,687	36,774	255,858	292,632	13,264	45,941	59,205	3,020	4,501	7,521	359,358	201,881	1,469,982	592,336	TOTAL

1/ Table SF-1, State Highway Income, and Table SF-2, State Highway Expenditures, published prior to 1940, have been replaced by a series, Tables SF-1 to 9, in order to set forth available data more completely and to afford a complete reconciliation between the State Highway Finance Data and Tables G-3, MV-3, MC-2, and DF, which give the disposition of receipts from state Imposts on Highway users. Tables SF-1 and SF-2 account for the receipts and disbursements of (1) all state Imposts on Highway Users, (2) all other Funds Available to the State Highway Departments, and (3) State Funds other than those of the Highway Departments which were reported as being applied to Highway Purposes. The other tables of the series deal with the following subjects: Tables SF-3 and 4, Receipts and Disbursements Applicable to State-Administered Highways; Tables SF-5 and 6, State Receipts and Disbursements Applicable to County and Local Roads and Streets; Tables SF-7 and 8, Receipts and Disbursements of State Highway Revenues applied to Nonhighway Purposes; Table SF-9, Coats of Collection and Administration of Highway-User Revenues. These tables do not include the transactions of Interstate Toll Authorities. Receipts and Disbursements of a number of Intrastate Authorities, notably the Pennsylvania Turnpike Commission, are not included, as complete reports were not received.

2/ Interest payments on State Highway Bonds and Notes, and on Obligations Assumed by State as Reimbursement to Counties or Local Units for Roads Added to the State Systems. For details see Table SF-4. Also includes small administrative charges in connection with Bond Sales or Debt Service.

3/ Retirements of State Highway Bonds and Notes, and of Obligations Assumed by State as Reimbursement to Counties or Local Units for Roads Added to the State Systems. For details see Table SF-4.

4/ Does not include Expenditures on Urban Extensions of the State Systems, which are included under "Expenditures on State-Administered Highways."

5/ Funds transferred to cities may have been used in part for Urban Extensions of the State Systems, but such amounts not reported.

1/ Expenditures on County Roads under State Control in Delaware, North Carolina, Virginia, and West Virginia are included with Expenditures on State-Administered Highways.

1/ Includes Transactions of San Francisco-Oakland Bay, Antioch, and Carquinez Toll Bridges, not included prior to 1941.

Highway Fund Diversion

Despite progress of the campaign to curb highway fund diversion, records show that it is still a great problem and statistics indicate diversion to be taking a proportionately greater toll now than heretofore. Estimate more than $1,750,450,000 of highway users' funds have been diverted to unrelated purposes by states since 1933.

By BETHUNE JONES

A GENERALLY BRIGHT outlook for further progress this year in the movement to curb highway fund diversion is indicated by developments thus far, despite the fact that these have not been entirely favorable.

Two states—Maine and Washington—already are scheduled, as a result of action by their 1943 legislatures, to hold referendums at next fall's general election on constitutional amendments outlawing the diversion of highway-user taxes to unrelated purposes.

Since such referendums have not heretofore been defeated in a single instance where they were clear cut issues, Maine and Washington are expected to be added to the list of states already having such constitutional protection for highway funds. Totaling 14, these states are Iowa, Oregon, West Virginia, Kansas, Missouri, California, Colorado, Idaho, Michigan, Minnesota, Nevada, New Hampshire, North Dakota, and South Dakota.

None of the eight states holding regular legislative sessions this year have such amendments and thus offer fertile ground for anti-diversion forces. Legislatures were convened in regular session at this writing in New York, New Jersey, Kentucky, Mississippi, South Carolina, Rhode Island and Virginia, with the Louisiana Legislature scheduled to convene in regular session in May. Some special sessions had already been held this year, principally to deal with the soldier vote issue; others were in session and more were expected to be called. Most of these special sessions, however, were being restricted to the soldier vote question and other special matters for which they were called.

New York Amendment

Initial approval was given an anti-diversion amendment by the 1943 New York Legislature, with the issue to go before the voters if also approved by this year's session. The New York amendment, however, would apply only to that state's regular 2-cent gasoline tax and not to two 1-cent emergency levies on gasoline. Action by the 1944 Legislature had not yet been taken at this writing and there was no advance indication of sentiment on the issue.

An anti-diversion amendment also was given initial approval in Pennsylvania in 1943, with approval of another legislative session required before the matter can be decided by the electorate. No regular session will be held in Pennsylvania until 1945, however, so that the state does not figure in this year's picture.

New Jersey's present highway fund, with its presumed dedication of automotive tax revenues to highway construction and maintenance purposes, would be abolished under one of the provisions of a proposed new state constitution which was approved March 3 by the State Legislature and will be submitted to the electorate at the November election.

Although highway user interests opposed the provision for merging highway and general funds, seeking unsuccessfully the inclusion of a provision outlawing highway fund diversion, the diversion issue will not be clear cut at the fall election and is not even likely to gain prominence. The vote at the referendum will be for adoption or rejection of the constitution in its entirety, with the result that there will be many affirmative votes from persons favoring constitutional reform but not necessarily liking all provisions of the proposal.

New Jersey's electorate last fall showed that it wanted a new constitution by approving a referendum directing the Legislature to draw up a draft for a popular vote at the November, 1944, election. In view of this expression of sentiment, together with the unexpected speed with which the Legislature acted, popular approval of the proposed draft is looked for by most observers in the fall.

Missouri has no regular 1944 legislative session, but its state constitution is open in a state constitutional convention now in progress. Since Missouri already has a state constitutional ban against diversion, any change adopted by the convention would be negative. While some municipal interests had indicated they would like to see the diversion ban removed, any basic change appears unlikely. Regarded as likely to be adopted, however, was a proposal for removal of an existing Missouri barrier to the use of state highway funds

● State highway funds are needed in all states for jobs similar to those pictured here. Left: International TracTracTor and Bucyrus-Erie 4-wheel scraper on road grading job at Monroe County, Georgia. Below: Caterpillar D8 tractor with LeTourneau Carryall re-aligning and widening U. S. Highway 101 near Santa Maria, California, as part of the Army's program for building a wide defense highway along the California coast.

● **Modern traffic interchanges like this Cloverleaf at intersections of Routes 2 and 4 near Paramus, N. J., are a postwar need in all parts of the country. Much of the money being diverted from highway purposes now will deprive states of these modern projects for highway convenience and safety.**

for construction and maintenance of highways passing through cities. Such use of funds was held necessary for adequate Missouri participation in federal postwar road plans.

Revision Is Issue in Georgia

Constitutional revision also is currently an issue in Georgia, although there is no regular legislative session there this year. A commission is currently at work on the task of revising Georgia's constitution, with public hearings on proposed changes scheduled to begin during the week of April 10. Highway user interests are seeking the inclusion of a provision banning the use of motor vehicle tax funds for purposes other than highway construction and maintenance.

Kentucky's Legislature has authorized the submission to the electorate next year of a proposed state constitutional amendment to outlaw highway fund diversion. The governor's signature was not required for the referendum bill passed March 9 by the Kentucky House after having earlier received State Senate approval.

Virginia's State Senate had at this writing adopted and sent to the House for concurrence a resolution to put the Virginia Legislature on record against the diversion of state highway funds. The resolution provided that it is "the sense of the General Assembly" that all funds received from gasoline taxes and motor vehicle registration shall be used "solely and exclusively" for highway construction and maintenance after certain expenses and obligations are taken care of. Although lacking the permanency and certainty of a state constitutional provision, such an expression would be welcomed by highway users and other anti-diversionists as a step in the right direction.

Passed by the Rhode Island House and awaiting State Senate action was a resolution to initiate a state constitutional amendment to protect special funds set up by the State Legislature so that they cannot be spent for other than their original purposes. This measure, which would require approval by this and the next Legislature, as well as the people at a statewide referendum, would apparently open the way to highway fund protection in that state.

Even in states where there is no immediate opportunity to act upon the diversion issue increased interest is expected to be aroused this year because of the attention being focused on postwar highway construction plans, which not only reveal the need for devoting highway user taxes exclusively to highway purposes for many years to come, but also in many instances clearly demonstrate the lack of wisdom in past diversions. Thus, the groundwork may be laid in a number of states for anti-diversion progress during 1945, when nearly all of the state lawmills will grind.

Trend in Wisconsin

One evidence of such a trend already has come from Wisconsin, where plans for a drive for a state constitutional ban against highway fund diversion during next year's session of the Wisconsin Legislature were laid at a recent joint conference of the Wisconsin County Boards' Association, the County Highway Commissioners' Association and the County Highway Committee Members' Association.

The extent to which the nation's highway system development has been impeded by the diversion practice is indicated by estimates that more than $1,750,450,000 of highway user funds have been diverted to unrelated purposes by the states since 1933. The practice reached a peak in 1941, when the total diverted soared to $215,039,000—enough to maintain the entire highway system of the states, 475,000 miles, for one year.

Examples of the diversion states include New York, which in the last 10 years diverted an estimated total of more than $626,000,000 from highways; New Jersey, which in a similar period diverted a total of more than $129,000,000, and Tennessee, where in the fiscal year ended June 30, 1943, only $1,417,939 from $20,500,000 of gasoline taxes went into the highway fund.

Despite the progress of the campaign to curb highway fund diversion, the record shows it is still a very great problem. In fact, the latest available statistics on the subject show it to be taking a proportionately greater toll now than heretofore. While the actual dollar amount used for non-highway purposes in 1942 was moderately lower because total highway user taxes declined, the proportion diverted on a nationwide basis during that year increased to 15.5 per cent from 14.8 per cent in 1941. Public Roads Administration data shows that total highway user taxes distributed in 1942 amounted to $1,321,391,000, of which $204,165,000 went for non-highway purposes, while in the preceding year a total of $215,039,000 was diverted from $1,452,011,000.

Financed Relief Costs

In most states the diversion practice cropped up as a means of financing unemployment relief costs during the depression decade, but in many instances it has persisted as a source of revenue for a variety of general governmental functions. That even further diversion avenues may be proposed in the future was indicated not long ago in North Carolina, where at a meeting of the State Aeronautics Commission, a proposal was advanced by municipal interests that highway funds be diverted to finance airport construction and state aviation control activities.

On the other hand, factors exist to support the possibility of a postwar reversal of the highway fund diversion practice, with general state funds being used to augment highway-user tax revenues in financing the states' share of contemplated postwar highway construction.

How to check your performance for

Maximum Tournapull Operating Efficiency

LOADING . . . Check These Points ✓

1. Are loads heaped each trip?
2. Is the load being obtained in 100 feet or less?
3. Is the load obtained in 1.0 minute or less?
4. Is traffic control keeping units coming into the pit at intervals of 1.5 to 2.0 minutes so that the pusher tractor will work efficiently—and so avoid unnecessary waiting by Tournapull units?
5. Is the pusher step-loading to reduce lost time and travel in the pit? (See job photo below right.)
6. If the material is too hard to load in efficient time and distance, is Rooter being used to break it up?
7. Always establish down-hill loading. It's rarely ever impossible.

TRAVELING . . . Check These Points ✓

1. Are roadways good enough to allow high gear travel at all times? 14 m.p.h. or over? If not . . .
2. Is the Tournapull-Scraper being used to keep haul roads in good condition? Or is a patrol available as the logical tool for this work?
3. Is each turn being made in .25 minute or less?
4. Is the operator utilizing full r.p.m. to obtain the quickest acceleration—thus increasing average speed?

SPREADING . . . Check These Points ✓

1. Are loads being spread in the highest possible gear?
2. Is spread made in .5 minute or less?
3. Is spread being made in 65 to 100 feet (approx. 8 inches to 5 inches loose depth)?
4. Is operator getting off the fill as quickly as possible?

MECHANICAL — (Check with LeTourneau Maintenance Manuals) ✓

1. Are all adjustments maintained?
2. Are blades installed properly to maintain sharp cutting edge?
3. Is all cable running free?
4. On hard smooth roads, are tires at maximum pressure? (See LeTourneau Tire Chart.)
5. For off-the-road work, are tires at minimum pressure, in relation to the load, to obtain flotation? (See LeTourneau Tire Chart.)
6. Are all mechanical moving parts greased and operating freely? (See LeTourneau Lubrication Chart.)

Use this Simple LeTourneau Check-List—It Covers Your Complete Earthmoving Cycle, Shows You How to Move Bigger Loads Faster and at Less Cost

To help you take fullest advantage of your Tournapulls' ability to move bigger yardages fast, here is a quick, easy way to check every operating step. This simple Tournapull check-list, prepared by the LeTourneau Field Engineering Department, shows you how to keep your rigs working at top efficiency in the cut, traveling and on the fill. Use it regularly for your Tournapull check-up to eliminate waste time and speed yardage output.

Another Time-Saver—Dealer Service

If your check-up shows a need for parts or repairs, call on your LeTourneau dealer. He's equipped to handle your service problems with a minimum of time out for repairs.

LeTourneau Co-Operator Offers More Help—Write for Copy

To keep your operators and repair crews informed on the most practical operating, service and repair methods. The LeTourneau Co-Operator is offered to you and your men FREE. 16 fact-packed pages . . . published 10 times yearly. Read regularly by over 50,000 contractors, loggers, miners and others who use and service LeTourneau equipment. Write for your copies TODAY. Address R. G. LeTourneau, Inc., Dept. EE-444, Peoria, Illinois.

As loaded Tournapull pulls out of the pit, pusher tractor is ready to swing around and contact second Tournapull, already loading in opposite direction.

Manufacturers of DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TOURNACRANES*.

*Trade Mark Reg. U. S. Pat. Off.

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

Shots from the FIRING LINE

All Cranes, Shovels Will be Needed by Services

Practically · all power cranes and shovels produced in 1944 will be needed by the armed services, the War Production Board reported recently. The majority of manufacturers are building only a few models and sizes of standard products, and in general they are not able to meet delivery schedules promptly. These facts were brought out at the recent meeting of the WPB Power Crane and Shovel Industry Advisory Committee.

Civilian needs are filled for the most part from used equipment. The inventory of used equipment (registered under order L-196) lists approximately 25,000 cranes and shovels, the committee was informed. However, not more than 10 per cent of the machines in good condition are idle at the present time, and only part of this percentage is available for sale. Twenty-four representatives of the used machinery section of the Construction Machinery Division are stationed in WPB field offices to assist contractors in locating used equipment.

Shovels, cranes, draglines, tractors, and motor graders are the types of equipment most in demand. Approximately 80 per cent of present requirements for used equipment are for these items.

Army to Loan Equipment for Road Emergencies

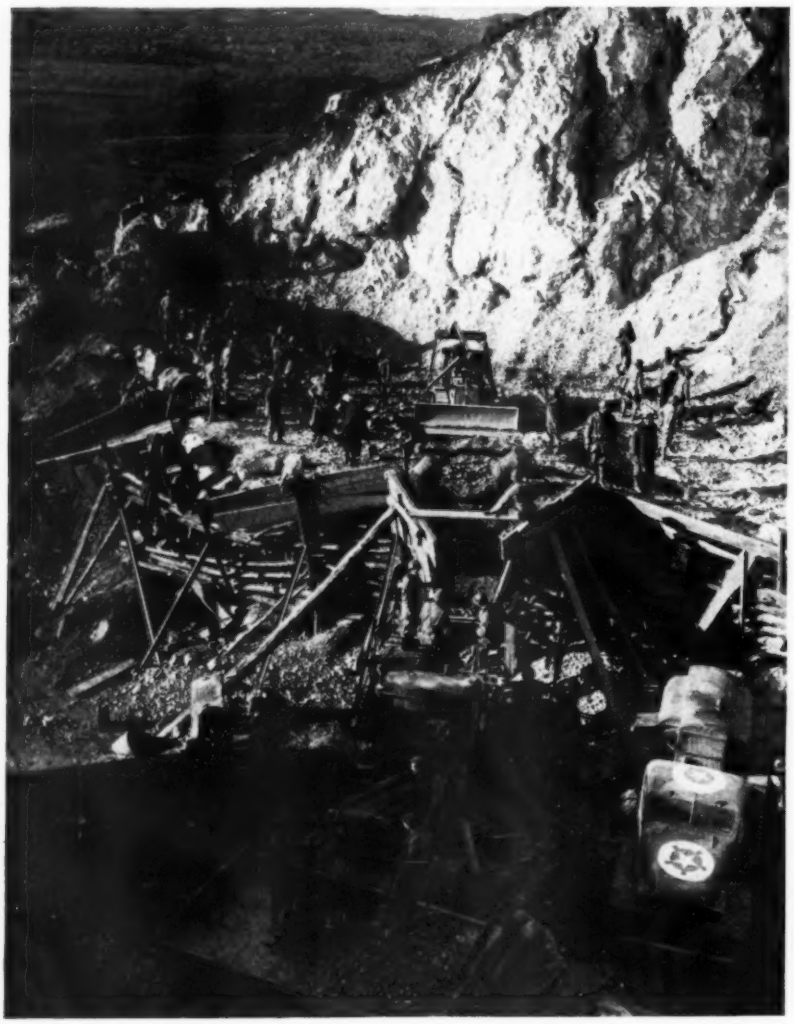
Under a directive issued by Lt. Gen. Brehon B. Somervell, Commanding General, Services of Supply, highway maintenance equipment, repair parts and maintenance supplies may be made available for highway maintenance and snow removal when they can be spared from other less urgent military uses.

While the order refers only to "state highway departments" an interpretation by the War Production Board indicates that counties, cities and other governmental highway agencies are included as well, according to a statement issued by the American Road Builders' Association.

Requests for assistance must pass through state highway departments to the Public Roads Administration for certification. The request then is forwarded to the commanding general of the service command for action.

Assistance from the Army will only be available in cases of an emergency. Just what constitutes an emergency has not as yet been clearly defined but it is indicated by informed sources that any needs which cannot be coped with through normal channels might readily constitute an emergency.

As in the past, the major portion of a highway department's needs for equipment and spare parts must be met through authorizations to procure through the War Production Board.



● LeTourneau bulldozer pushes material down ramp into small portable crusher and screening plant powered by Buda engine in rock quarry operated by an Army Engineer Battalion in Italy. LeRoi compressor to left foreground.

—*U. S. Army Signal Corps Photo.*

Ask Federal Action On Inter-Regional Highway

A plea for federal action on the report of the National Inter-Regional Highway Committee, which was transmitted to Congress in January by President Roosevelt, was made in a resolution adopted by the Association of Highway Officials of the North Atlantic States during its two-day annual convention in New York City.

The officials from the 11 North Atlantic states gave their support to an effort "to secure the adoption of the provisions of this report by appropriate federal action with the proviso that in the development of such a program the state highway departments be entrusted with broad and flexible powers of decision as to the means of carrying out such a program in accordance with its own intrastate requirements."

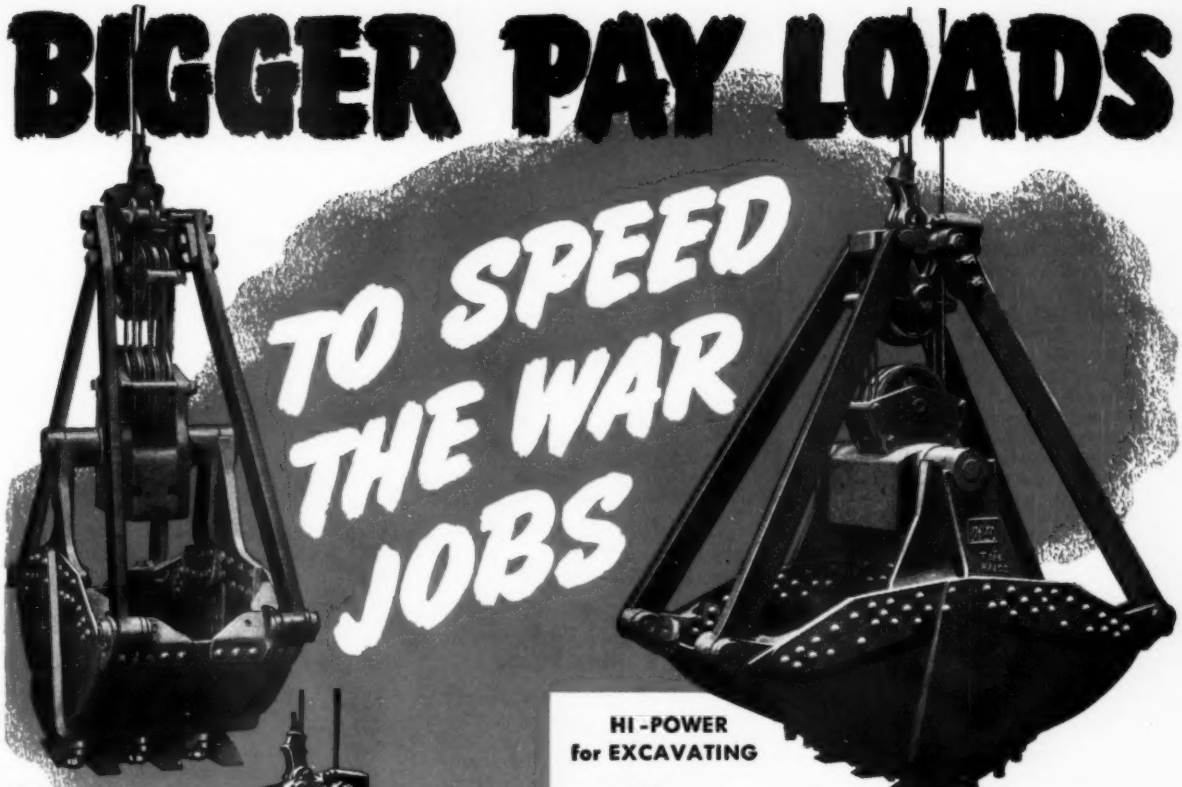
Presented after a three-year study, the Inter-Regional Highway Committee's report proposed a postwar road building program embracing 33,920 miles of super highways, which would create work for 2,000,000 men and take from 10 to 20 years to complete at an estimated cost of $750,000,000 a year.

Delegates to the conclave of the North Atlantic group also adopted a resolution petitioning Congress to make provision "for use at moderate cost and on an equitable basis to state and county highway departments" of part of the $70,000,000,000 surplus war equipment and supplies, estimated to be available at the end of the war, for highway maintenance and the improvement of local roads.

The association also urged states,

BIGGER PAY LOADS

TO SPEED THE WAR JOBS



HI-POWER for EXCAVATING

Narrow bowl HI-POWER for TRENCHING

MULTI-SHEAVE for Re-handling

HAISS HI-POWER BUCKETS have what it takes to get the work done faster . . . power and performance engineered into every inch of design and manufacture. Haiss Hi-Power is plenty tough and your crane operator will know it when he puts one to work. Brute strength to bite a bigger pay-load. Hi-Power to dig down for a heaped-up grab. Longer bearings and alloy steels to resist wear. Oversize hinge pins and husky corner arms.

Fifty years of designing and building adds up in Haiss Hi-Power to bigger pay-loads for you . . . better performance all around.

GEORGE HAISS MANUFACTURING CO., INC.
144th St. and Park Ave., New York, 51, N. Y.

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●

BUCKET AGENCIES THROUGHOUT THE COUNTRY

HAISS

PORTABLE CONVEYORS ★ LOADERS ★ CLAMSHELL BUCKETS

counties and municipalities to plan for financing of postwar highway improvements from their own funds "or through well conceived and fairly administered federal aid."

Speakers heard during the sessions were in agreement that federal aid would be necessary for postwar highway projects, but divergent views were expressed as to the best methods of apportioning it.

Connecticut Highway Commissioner William J. Cox, who was elected head of the group to succeed Herman A. MacDonald of Massachusetts, advocated legislation "that will distribute funds according to the road needs of each state," rather than on the basis "of political needs."

MacDonald suggested that the federal government change its formula for distributing among the states money for new highway construction so as to give the more populous states a more generous share.

Samuel C. Hadden, president of the American Association of State Highway Officials, urged support of legislation now in Congress that proposes the apportionment of federal appropriations to the states on the basis of one-half for population and one-fourth each for area and existing mileage.

Immediate and generous appropriations by Congress for an adequate program of postwar planning was urged by Mayor F. H. LaGuardia of New York City, who predicted that his city would encounter great difficulties "within 18 months after the end of the war" with its existing highway facilities.

● **Osgood shovel, two LaPlant-Choate bulldozers and a LeTourneau bulldozer on the move toward a new place of construction on the Alaska Highway. — *National Film Board Photo.***

Ease Restrictions on Purchase of Repair Parts

Restrictions on the purchase of repair parts for construction machinery and equipment were eased by the War Production Board. Parts for current use may now be purchased by certification by the purchaser instead of through application for WPB authorization, with the exception of purchase orders of more than $1,000 for parts for shovels, cranes, and draglines of less than 2½-cu. yds. capacity. Such purchase orders are subject to WPB authorization.

This change is effected by Order L-192 as amended today. Approximately 85 per cent of all new construction equipment is needed to fill military requirements, the WPB Construction Machinery Division said. This means that used equipment must take care of civilian needs. It has therefore been found advisable to facilitate the purchase of repair parts required to keep the equipment in operation by relaxing restrictions insofar as possible.

Shovels, cranes, and draglines are the most critical items covered by order L-192, which controls the production and distribution of specified types of construction equipment. The authorization required for repair parts' purchase orders of more than $1,000 is designed to conserve parts for the most essential uses.

Certification of purchase orders in all other cases is in substantially the following form: "Authorized under order L-192—current use." This certification means that the repairs parts ordered are required to replace worn out parts within 30 days after receipt and are not for stock; that the purchaser does not have other parts on hand or on order for this purpose; and that he has complied with the provisions of order L-196.

Minor Revisions in Construction Order

The War Production Board announced a minor revision of Order L-41, the overall order limiting construction, to make it conform with

(Continued on page 192)

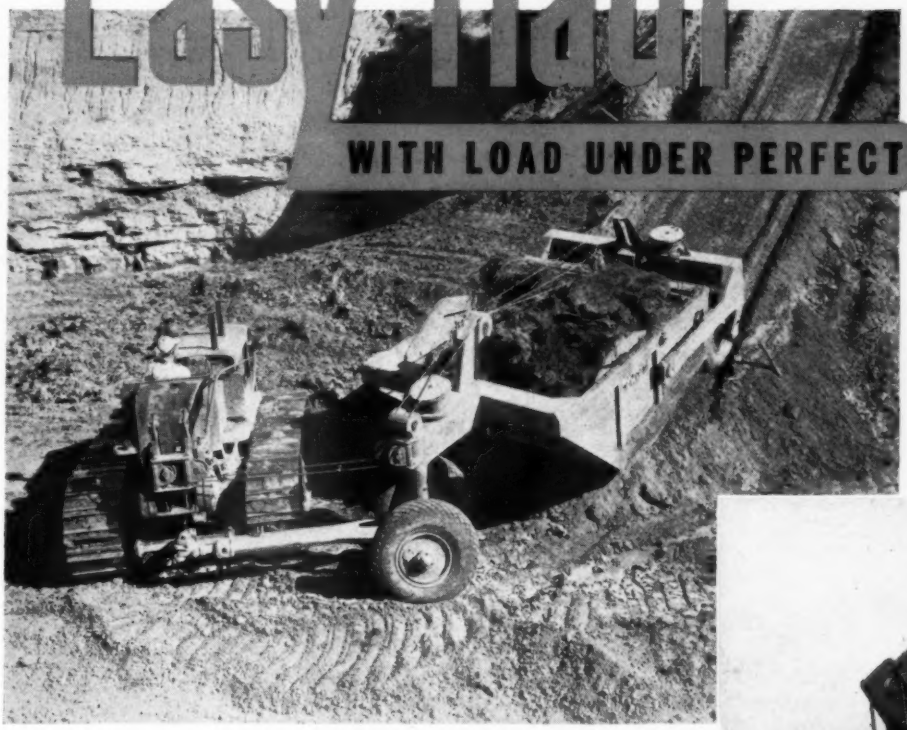
LINN HAFTRAKS show their mettle
from the Equator to the Arctic Circle

●

THE LINN MANUFACTURING CORPORATION
MORRIS • NEW YORK

Easy Haul

WITH LOAD UNDER PERFECT CONTROL



Bucyrus-Erie S-90 Scraper equipped with Timken Bearings in all wheels.

Bucyrus-Erie P-24 Power Control Unit equipped with 6 Timken Bearings.

Uphill, downhill, or on the level — scraping or carrying — Bucyrus-Erie S-90 Scrapers take all loads lightly because they take them on Timken Tapered Roller Bearings with which all the wheels are equipped. This also means smoother operation; greater endurance; lower maintenance.

Control of the load during loading and dumping likewise is rendered easier and more positive through the application of Timken Bearings (6) in the Bucyrus-Erie P-24 Control Unit installed at the rear of the tractor.

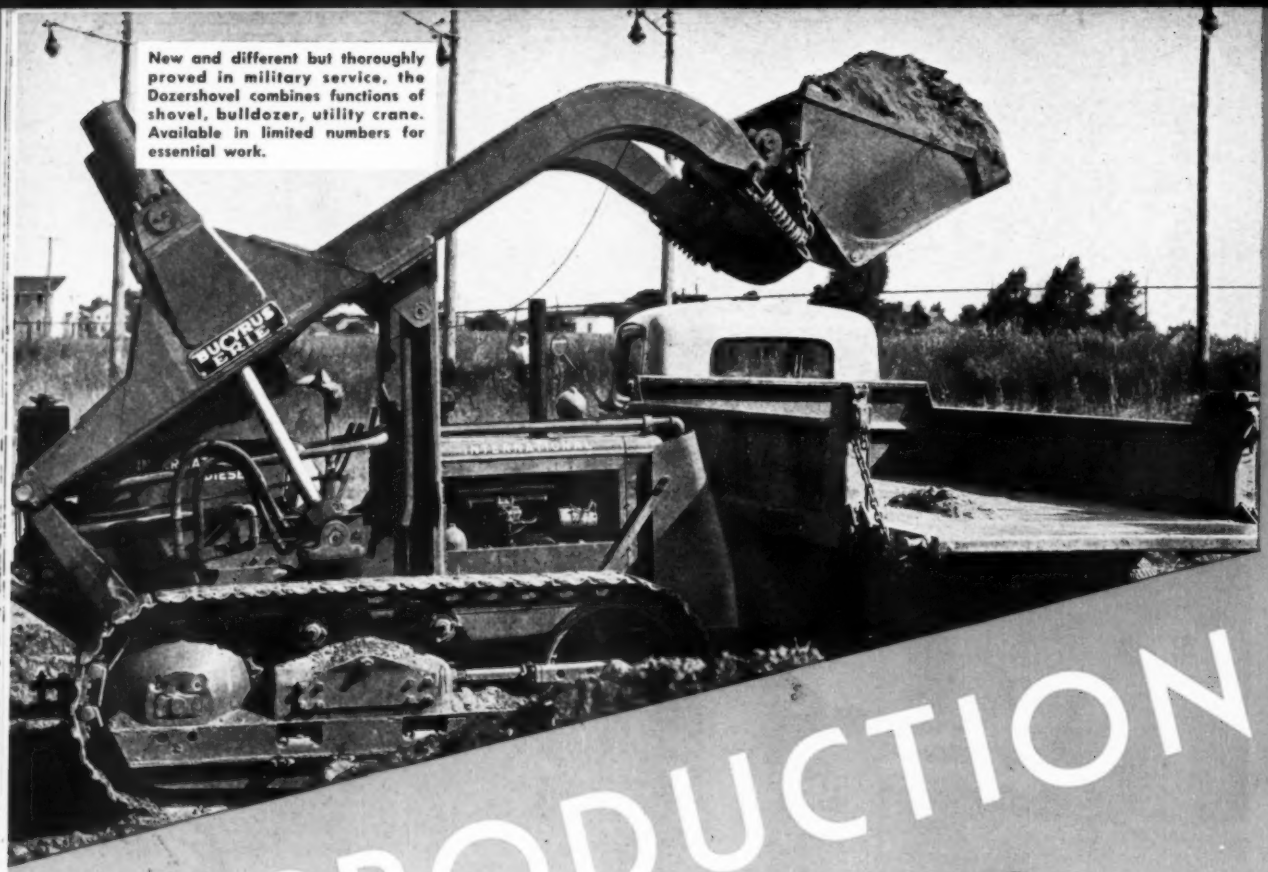
Whether you are a manufacturer or user of construction equipment it will pay you to make sure you have Timken Bearings at every suitable position. The Timken Roller Bearing Company, Canton 6, Ohio.

Tapered Roller
TIMKEN BEARING
EQUIPPED

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



New and different but thoroughly proved in military service, the Dozershovel combines functions of shovel, bulldozer, utility crane. Available in limited numbers for essential work.

For PRODUCTION in War or Peace

Bucyrus-Erie Tractor Equipment

A one-man road maintenance crew, this Bucyrus-Erie Bullgrader-scraper dual unit will improve and maintain many miles of road per dollar of tax revenue.

Big payloads and fast digging are two factors which assure you low cost dirt with Bucyrus-Erie four-wheel scrapers.

The heat of wartime construction is still on, and prospects are bright for extensive building in the postwar period, too. To get maximum production now and the most in profits when peace returns, you need equipment that can deliver big output and stand the gaff.

Bucyrus-Erie's war experiences added to that gained in more than sixty years in the dirt-moving game has produced tractor equipment that is tops in materials, design, and workmanship. That's why, when you buy Bucyrus-Erie tractor equipment you get the toughest, most productive units on the market. It's the kind of unit you need for wartime road construction now, and it's this kind you'll have to have for big profits after the war.

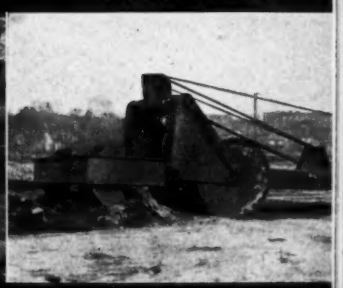
Let us tell you about the complete line of Bucyrus-Erie tractor equipment.

M-84

Hydraulic Bulldozers

Hydraulic Bullgraders

Power Control Units



Cable Rippers

Rotary Rippers

Tractor Cabs

Tamping Rollers

Back-Dump Scrapers

BUCYRUS ERIE TRACTOR EQUIPMENT

SEE YOUR
INTERNATIONAL TRACTRACTOR
DISTRIBUTOR

Shots from the Firing Line

(Continued from page 188)

other recently amended WPB orders also concerned with construction. The only two substantive changes made are as follows:

(1) On airport construction, the limit allowed without getting WPB permission for any job begun in the same year is placed at $1,000 as against the limit of $200 which formerly held, and (2) The exception previously given to the installation of plumbing and heating equipment rated on WPB form 2631 (formerly PD-851) is revoked. Hereafter, WPB permission under Order L-41 will be necessary on all plumbing and heating installations where the cost of the construction including the cost of the equipment is in excess of the L-41 cost limits. Applications for this type of construction must be made on WPB form 2896.

Other revisions merely clarify or reflect recent changes in procedures.

Postwar Highway Plans In South Carolina

South Carolina is completing plans for a $17,000,000 postwar highway construction program, it was announced by C. R. McMillan, chief highway engineer. Representing the biggest road program ever contemplated by the state, the plans call for 1,826 miles of road and 209 bridges. A double-lane, hard-surface road between Aiken and Augusta is the largest single project.

Remove Restrictions on Tractor Repair Parts

Upon the request of military procurement agencies, general restrictions on the annual quantity or dollar value of repair parts for track-laying tractors they may acquire have now been removed.

However, the provision that limits military agencies to maximum purchases of 40 per cent by dollar volume of all shipments of critically short items made by manufacturers will remain in force.

Removal of restrictions has been accomplished by revoking that portion of Limitation Order L-53-b (subparagraph 3 paragraph b) which formerly prohibited military agencies from acquiring more than 40 per cent by dollar volume of all shipments of track-laying tractor parts during the year ending June 30, 1944.

Highway System For India Planned

Engineers from the Provinces and States in India recently estimated that a system of 400,000 miles of roads with approximately one-half hard surfaced is needed to provide an adequate network of provincial, district, and village roads. The engineers' conference recommended immediate creation of a road board with authority and power to coordinate and direct highway development and ask for highway legislation for all parts of India. An enactment to prevent ribbon development is also advocated.

February Construction Shows Increase

Construction contracts awarded during February totaled $137,246,000 in the 37 eastern states, according to F. W. Dodge Corporation. This was an average of $6,238,000 per working day and was slightly above the January daily average. The February total, however, was 65 per cent below the corresponding month last year.

Contracts let for heavy-engineering work were valued at $55,116,000 as compared with $50,333,000 in the preceding month and $112,981,000 in February, 1943. Both building classifications were below January, 1944 and February, 1943 with valuation totals of $57,269,000 for non-residential and $24,861,000 for residential building. Number of new dwelling units created during the month, 7,138, also represented a drop from 10,577 in the preceding month and 24,703 in February a year ago.

Tennessee Highways Need $205 Million Of Work

Expenditures of $205,000,000 would be required to bring Tennessee's high-

Cone Type Swing Friction for Northwest Shovel. Precision moulded in proper sizes for all models.

GATKE Moulded Frictions

Whether it's loading rock or swinging heavy loads on a long arc, GATKE Moulded Frictions give you plenty extra—

Tremendous power for positive, effortless control with no let down when things get hot;

Smooth, non-grabbing action that gets the job done with reduced strain on men and equipment;

Long wear life that gives steady operation and avoids adjustment delays.

Unless you are using GATKE Frictions *you are missing plenty*—they are *guaranteed to do the job better.* Just tell us what you need or write for literature.

Other **GATKE PRODUCTS**

Brake Lining and Clutch Facings for all requirements of Shovels, Drag Lines, Cranes, Hoists, Trucks, Tractors, Trailers, and all kinds of Road Building, Excavating and Construction Equipment.

Non-Metallic Bearings for replacement service. Engineered for the application and moulded to machined accuracy in all shapes and sizes. Send for bulletin.

GATKE CORPORATION
232 N. LaSalle St. Chicago

Never mind "who done it"—pitch in and help get it down!

THIS IS YOUR UNCLE SAM talking—but I'm going to talk to you like a DUTCH uncle, to keep all of us from going broke.

Ever since the Axis hauled off and hit us when we weren't looking, prices have been nudging upwards. Not rising awfully fast, but RISING.

Most folks, having an average share of common sense, know rising prices are BAD for them and BAD for the country. So there's been a lot of finger pointing and hollering for the OTHER FELLOW to do something—QUICK.

The government's been yelled at, too. "DOGGONNIT," folks have said, "WHY doesn't the government keep prices down?"

Well, the government's done a lot. That's what price ceilings and wage controls are for—to keep prices down. Rationing helps, too.

But let me tell you this—we're *never* going to keep prices down just by leaning on the government and yelling for the OTHER FELLOW to mend his ways.

We've ALL got to help—EVERY LAST ONE OF US.

Sit down for a minute and think things over. Why are most people making more money today? It's because of the SAME cussed war that's killing and maiming some of the finest young folks this country ever produced.

So if anyone uses his extra money to buy things he's in no particular need of . . . if he bids against his neighbor for stuff that's hard to get and pushes prices up . . . well, sir, he's a WAR PROFITEER. That's an ugly name—but there's just no other name for it.

Now, if I know Americans, we're not going to do that kind of thing, once we've got our FACTS straight.

All right, then. Here are the seven rules we've got to follow as GOSPEL from now until this war is over. Not some of them—ALL of them. Not some of us—ALL OF US, farmers, businessmen, laborers, white-collar workers!

Buy only what you need. A patch on your pants is a badge of honor these days.

Keep your OWN prices DOWN. Don't ask higher prices—for your own labor, your own services, or goods you sell. Resist all pressure to force YOUR prices up!

Never pay a penny more than the ceiling price for ANYTHING. Don't buy rationed goods without giving up the right amount of coupons.

Pay your taxes willingly, no matter how stiff they get. This war's got to be paid for and *taxes are the cheapest way to do it.*

Pay off your old debts. Don't make any new ones.

Start a savings account and make regular deposits. Buy and keep up life insurance.

Buy War Bonds and hold on to them. Buy them with dimes and dollars it HURTS like blazes to do without.

Start making these sacrifices now—keep them up for the duration—and this country of ours will be sitting pretty after the war . . . *and so will you.*

Uncle Sam

KEEP PRICES DOWN!

Use it up • Wear it out
Make it do • Or do without

This advertisement, prepared by the War Advertising Council, is contributed by this magazine in co-operation with the Magazine Publishers of America.

● Bucyrus-Erie Dozershovel cleaning up rubble after repairs to an open hearth furnace.

way system up to minimum transportation requirements, according to estimates of State Highway Department engineers as announced by Commissioner W. C. Phillips.

Commissioner Phillips said the estimate was based on engineers' surveys of work needed at the start of the war and would not necessarily mean the inclusion of any super highways. He explained the estimate did include the rebuilding of wornout macadamized roads so they would meet demands placed upon them. The estimate did not include the rebuilding of all farm-to-market roads, he added, but rather took in the main arteries in the state's system with the development of feeder highways for strategic thoroughfares.

Tennessee's present highway system, comprising 7,500 miles, represents an investment of approximately $300,000,000, all of which has been spent since passage of the first federal aid act in 1915.

It was not by any means anticipated that the state would launch a $205,000,000 program, Commissioner Phillips said, explaining the estimates were prepared merely to see just what would be needed to bring roads up to a point where they would meet the demands of present traffic.

Tennessee's Highway Department already has plans ready for $8,000,000 of postwar construction; another $8,000,000 program in the stage where it could be completed within a short time, and $7,500,000 worth of projects in the survey stage but which could be speeded up if the war ended and funds became available.

Tennessee will be in as good shape as any state in the country as far as postwar highway plans are concerned, according to Commissioner Phillips, who also predicted the state will be able to match funds freed by the federal government at the close of the war.

The state's highway fund has between $8,000,000 and $9,000,000 and has been growing rapidly in the last few months since the State Funding Board stopped diverting highway funds into the sinking fund.

Committee Hearings on Highway Development Bill

Questions involving the formula for distribution among the states of proposed post-war Federal-aid highway funds and the basis of Federal-State matching of funds featured House Roads Committee hearings on H.R. 2426 (same as S. 971) during March.

The measure, sponsored by the American Association of State Highway Officials, proposes a $4,000,000,000 street and highway development program during the first three years following the end of the war, with 75 per cent of the money to be supplied by the Federal Government and 25 per cent by the States.

It would change the formula for apportioning funds among the states from the regular method of one-third on the basis of population, one-third on the basis of area and one-third on post road mileage to one-half population, one-fourth area and one-fourth post road mileage in order to give a larger percentage of Federal funds to the more populous states that are confronted with problems of serious urban traffic congestion.

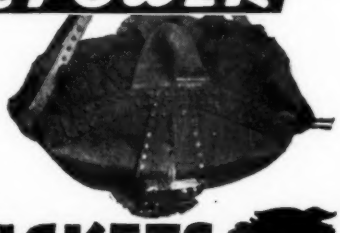
Although it was generally known that minority opposition to the proposed formula existed within the ranks of AASHO, questions by Committee members and replies from witnesses further indicate that:

1. There may be a compromise on the matching of funds somewhere between the regular 50-50 basis and the 75-25 proposed in the bill, or

2. Post-war funds for rural roads when designated, in the same manner and under the same procedures as have applied to the Federal-aid system ap-

PERFORMANCE
Packed with POWER

Abundant power with means of applying it efficiently to every need, is a feature of both U.S. aircraft and Owen Buckets.
In Owen Buckets power may be utilized with most efficient performance in every situation through adjustable counterweights and adjustable reeving. Investigate



THE OWEN BUCKET CO.
6096 BREAKWATER AVE . CLEVELAND, O.
BRANCHES. New York, Philadelphia, Chicago, Berkeley, Cal.

OWEN BUCKETS
A MOUTHFUL AT EVERY BITE

THIS is a dirt-moving war . . . *a tractor war.* Already the history of World War II is brimful of heroic jobs done by crawler tractors, equipped with bullgraders, bulldozers, scrapers, shovels, winches, and a variety of other dirt-moving equipment.

As a two-star general of the Army Engineers puts it: "Victory seems to favor the side with *the greatest ability to move dirt.*"

Munda . . . Rendova . . . the Solomons . . . Kiska . . . Sicily . . . Salerno . . . everywhere our fighting forces go, you'll find these armored giants building roads, smoothing shell-torn landing fields, pulling heavy guns, handling aircraft bombs.

The Armed Forces have first call on International TracTors today. That's why so few new ones are available for civilian use. The new TracTracTors you need so much today, to replace badly worn equipment, are more urgently needed on the fighting fronts.

Many of your old Internationals have a lot of work-hours left in them. Keep those tractors well serviced. Work closely with your International Industrial dealer. He has the skilled service men, the well-equipped shop, and the stock of International Parts to help keep your TracTracTors plugging on the home front, backing up the military TracTracTors on the battle front.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

INTERNATIONAL POWER

may be allocated on the basis of the regular Federal-aid formula with an additional authorization for work within metropolitan areas to be distributed according to a separate formula.

Spearheading the opposition to the allocation formula proposed in the bill, Commissioner William J. Cox of Connecticut appeared in advocacy of H.R. 4170 by Representative Miller (R., Conn.), which would divide the postwar highway program into three parts.

"Part I. $600,000,000 a year for a three-year total of $1,800,000,000 on the basis of the ratio which the estimated number of persons that will be demobilized from the military and industrial service in each state bears to the total estimated number of persons to be demobilized in all of the states; such estimates of demobilization to be based on the figures reported in the July, 1943, issue of the Monthly Labor Review of the Bureau of Labor Statistics, United States Department of Labor. Part II. $200,000,000 a year for a three-year total of $600,000,000 in accordance with the provisions of section 21 of the Federal Highway Act of 1921. Part III. $200,000,000 a year for a three-year total of $600,000,000 on the basis of the ratio that the total motor-vehicle registration in each state bears to the total motor vehicle registration in all of the states.

"Sec. 5. The sums apportioned for each year shall be available as follows: Part I. For construction on the designated interregional highway system and the alternate and auxiliary routes, propriations in the past, except as modified by provisions of this Act. Part II. For construction on Federal-aid primary and secondary systems as the states may elect. Part III. For construction on roads or streets not on the Federal-aid highway systems and under the jurisdiction of either the states or their local subdivisions."

Commissioner Cox favored a 50-50 matching basis with the Federal Government's share of the $4,000,000,000 program reduced by $1,000,000,000 and the states' share increased by like amount.

AASHO opposition to S. 1498 by Senator Stewart (D., Tenn.) to create a "Rural Local Roads Administration" outside the Public Roads Administration to administer the expenditure of Federal funds for improvement of secondary and farm-to-market roads was indicated by Fred R. White, Chief Engineer, Iowa State Highway Commission, who questioned "the advisability of such measure."

There appeared to be complete agreement among Committee members and witnesses on the need for early action on a Federal program of postwar highway development with differences of opinion revolving around important details.

The hearings were highlighted by testimony of eight members of the AASHO discussing features of the bill under special subject headings followed by the two-day testimony of Commissioner Cox in behalf of the proposed substitute formula. This is being followed by individual witnesses of representatives of all state highway departments and representatives of trade associations and highway user groups.

Thomas H. MacDonald, Commission-

Finish Ahead of Schedule

HERE is a Barber-Greene Normal Duty Travel Plant working days ahead of schedule on a sand-asphalt job in southern Mississippi. The plant was mixing two yards of loose material per minute, living up to its reputation for speed, economy, and perfection. Operating continuously and consistently, the Barber-Greene is setting a smooth, fast pace on a stiff production schedule. There is no reason for having less than a Barber-Greene. It is available in four sizes. You should have complete information. H5

Write your Barber-Greene Representative for Catalog 848

BARBER GREENE
AURORA ILLINOIS

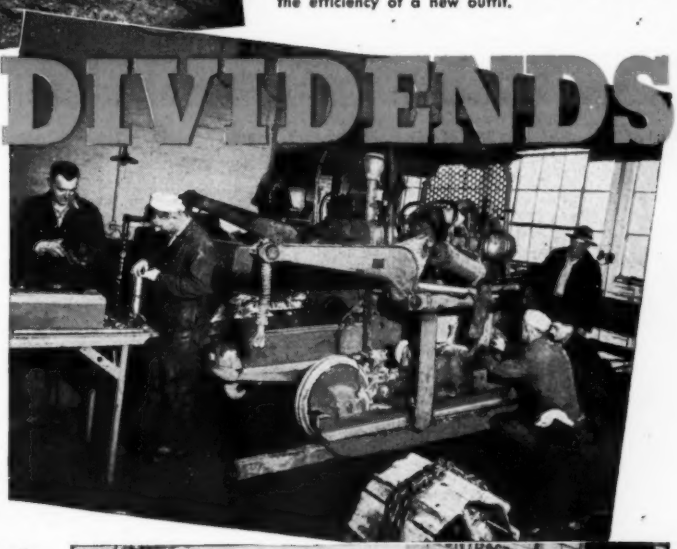
● **Four-yard capacity trucks are loaded in slightly less than two minutes with Bauxite ore — basic material used in aluminum production—in operations near Abbeville, Alabama, with this Athey W4-1 MobiLoader with an 1⅛-cu. yd. bucket capacity.**

LEFT: 2-Cycle Diesel being taken into Walling's shop for check-up and repairs.

CENTER: After several thousand hours of steady service, the HD-7 is shown undergoing the complete overhaul — which included removing the motor and "taking it down" — installing new sleeves, pins and rings, new main bearings, new valves and reseating heads, new filters, new fan belts, new flame heater switch and motor, and overhauling the oil pump-blower and water pump. The left hand final drive was removed and new seals, one track sprocket and rear axle bracket were installed. Steering clutch brakes were relined, steering clutches adjusted and batteries recharged. The tracks were adjusted and track bolts installed, where necessary. In addition, the bulldozer was repaired and logging drum tightened. Plenty of work to get done in 3½ days!

BELOW: It leaves the shop, ready to perform with the efficiency of a new outfit.

IT PAID DIVIDENDS



Proves Worth While To Have Tractor Repaired In Dealer's Shop

Salem Sand & Gravel Co., big-time contractor operator in Salem, Oregon, received a tip that really paid off when they called Walling Tractor & Equipment Corp., Allis-Chalmers dealer at Portland, Ore., for a service man to make adjustments on its 2-Cycle Diesel tractor.

Knowing that the tractor had been run steadily on tough work for several years without an overhaul . . . Walling suggested that it be taken into their up-to-date shops for a complete check-up — where special tractor tools and a skilled crew of mechanics were right on hand. He also suggested that the tractor operator accompany the unit to approve the work and to pitch in and help — thereby cut the time and cost of the job and learn more about the outfit he was running.

This contractor immediately saw the advantages of having the job handled this way and readily agreed. That it paid dividends is shown by the amount of work the tractor required (see center caption) and the short time in which it was accomplished — only 3½ days — regardless of the shortage of manpower and critical materials. Now it's performing like a new unit — paying off for the work done.

It will pay you dividends, too, to have major repairs handled in your A-C dealer's shop. Like Walling Tractor & Equipment Corp., your Allis-Chalmers dealer is fully equipped to help you. Let him put your outfits in A-1 condition . . . get peak performance NOW!

ARMY NAVY

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE, U. S. A.

● Caterpillar Diesel D8 tractors with LeTourneau bulldozers pushing out fill material for the dike as U. S. Army Engineers drain a lagoon for construction of an airstrip on a creek bed on Adak Island in the Aleutians.

er of Public Roads of the Federal Works Agency, is expected to be the final and most important witness.

Three Reclamation Bureau Veterans Resign

Retirement of three veterans of the Bureau of Reclamation's Pacific Northwest staff, all outstanding in their fields of work and whose combined services with the Bureau total 80 years, was announced by Commissioner Harry W. Bashore. The three are:

B. E. Stoutemyer, Portland, Ore., district counsel for the Bureau in Idaho, Washington and Oregon, and one of the West's most eminent waterright lawyers, who has resigned after 35 years of service.

Charles E. Crownover, construction engineer on the Rosa division of the Bureau's Yakima project in Washington and director of that important work during the period when the most complicated features of the project were successfully completed; Mr. Crownover completed 35 years of service when he retired March 1.

John A. Beemer, construction engineer in charge of the building of Anderson Ranch Dam of the Boise project in Idaho, the largest structure of its kind man has ever attempted; he has served the Bureau since 1933.

Roads Planned in Chinese Province

Reports from Nanking, former Chinese capital now occupied by the Japanese, state that some $20,000 are to be spent on new road bridges in Fukien Province. In addition, $1,040,000 are to be spent on highway improvements in that province.

Highway Users Ask Fund Protection

New Jersey highway user organizations recently appeared at a hearing on revision of the State Constitution

WELLMAN WILLIAMS TYPE BUCKETS

BUCKET QUALITY BACKED BY TWO FAMOUS NAMES

Williams Buckets have been famous for nearly 40 years for their many mechanical features.

Since 1931, Williams Buckets have been built by Wellman, known for many great engineering achievements in the heavy iron-ore, coal, and steel industries. The welded construction which featured Wellman custom-built buckets for extra heavy steel mill service, is now used in all

Wellman-Williams Buckets
FOR LONGER SERVICE WITH LESS MAINTENANCE COST

Built in Multiple Rope, Power Arm, and Power Wheel Types in ⅜ yd. to 16½ yd. capacities.

The Wellman Engineering Company
7002 Central Avenue • Cleveland 4, Ohio
Sales and Service Agencies in Principal Cities

Send for Free Bulletin
Tell us about your particular requirement and we will send full description of construction and features in special bulletins which clearly prove why YOUR NEXT BUCKET SHOULD BE A WELLMAN.

ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION

HOW TO SOLVE OPERATING PROBLEMS WITH *Correct Lubrication*

Get Tough Oils for Tough Giants!

BIG, TOUGH power shovels like this involve a great many lubrication problems—both outside and inside.

Outside, exposed to the weather and subject to constant shock loads, there are bearings, slides, open gears and wire ropes, all requiring protection against wear and rust. *Inside,* there may be internal combustion engines, electric motors, enclosed gears and plain and anti-friction bearings, each with special lubrication needs.

For the heavy-duty *outside* service, Socony-Vacuum recommends its Gargoyle Viscolite Oils and Fluids—the Oils for bearings, slides and cables—the Fluids for open gears. These special lubricants provide thick, strong films that absorb impact and reduce wear. They stick on the job, rain or shine, for maximum protection with minimum feeds.

The complete Gargoyle line—built up through 78 years' lubrication experience—includes the exact oil or grease for the important machinery *inside* the shovel. Ask your Socony-Vacuum representative for recommendations. Let him help you keep your shovels on the job!

GARGOYLE Lubricants

SOCONY-VACUUM OIL CO., INC., Standard Oil of N. Y. Div. • White Star Div. • Lubrite Div. • Chicago Div. • White Eagle Div. • Wadhams Div. • Magnolia Petroleum Company • General Petroleum Corporation of California.

CALL IN SOCONY-VACUUM

● Bucyrus-Erie 10-B crane being used by the Seabees for the construction of the foundation of barracks in the Solomons. — *Official U. S. Navy Photograph.*

urging that a provision be included guaranteeing that special motor vehicle taxes be dedicated solely to highway purposes. Those advocating such constitutional protection of highway funds (already adopted in 14 states) include: former State Senator David H. Agans, Master, New Jersey State Grange, Mrs. Kathryn D. Sullivan, New Jersey Conference of Automobile Clubs, Miss Alta R. Ely, Manager of the Automobile Legal Association, W. J. Gaffney, Secretary of the New Jersey Petroleum Industries Committee, William L. Mallon, Executive Secretary of the New Jersey Automotive Trade Association, Herbert Voorhees, President of the New Jersey Farm Bureau, D. J. Crecca, Manager of the New Jersey Motor Truck Association and Jacob Spiegel, President of the New Jersey Association of Township Committeemen.

Drive to Prevent Blasting Cap Injury to Children

Many agencies throughout the country are assisting in the campaign to protect children from the dangers of playing with blasting caps. During 1943, more boys and girls were injured than in the preceding year, this in spite of the fact that school authorities, publications, government agencies, safety and public health authorities, radio, and national organizations united wholeheartedly in an effort to educate the public to the dangers of blasting caps in the hands of children, according to the Institute of Makers of Explosives, New York City.

Blasting caps, necessary in mining, quarrying, road building, construction of various kinds, in blasting stumps, boulders, ditches, and other phases of agriculture, unfortunately, through carelessness are left lying about after blasting operations. Children have found them along highways, in fields, near quarries and mines, in barns, and even in cupboards in the home. Children hammer or pick at them, throw them in bonfires or against walls. The resulting explosion throws particles of metal in all directions and kills, injures or cripples the child.

Colored posters and leaflets, suitable for use on bulletin boards in schools, plants or public buildings, are available without charge on application to the Institute of Makers of Explosives, 103 Park Avenue, New York 17, New York. Since the campaign was initiated in 1925, the Institute reports that there has been a substantial reduction in the number of children injured annually.

25th Annual A.G.C. Meeting

The 25th annual meeting of The Associated General Contractors of America, held in Chicago, February 7-9, 1944, adopted a resolution opposing "the principle and practice of making federal grants to states, counties, cities or other governmental units for the construction of public improvements of local benefit only."

Other resolutions were as follows:

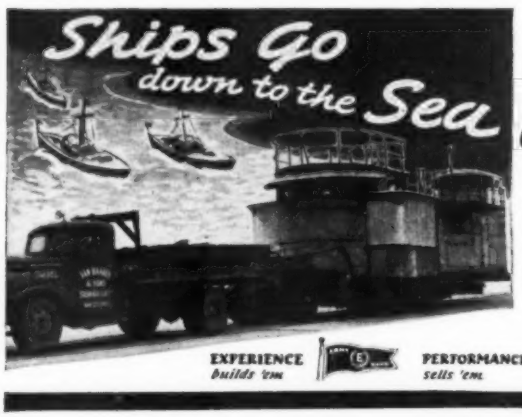
1. Requested that the Wage Adjustment Board in construction be directed "to define clearly the geographical area and type of construction to which each of its decisions shall apply."

2. Urged the officers, chapters and branches to apply themselves to plans and methods whereby they may serve as intermediaries in returning key personnel from the armed services to contractors' organizations.

3. Endorsed legislation for a postwar highway construction program recommended by the American Association of State Highway Officials, asserted that the industry has the capacity to execute the program, recommended that it be administered by the Public Roads Administration and state highway departments, and urged that it be executed by contract.

4. Recommended that in the disposal of surplus federally-owned construction equipment at the end of the war: dumping be avoided, equipment be appraised before being offered for sale and none be distributed on a gratis basis, equipment be offered for sale only to manufacturers, dealers and recognized distributors, and disposal be made by the agencies owning or having control of the equipment.

New officers elected at the meeting were: President, William Muirhead, president of the William Muirhead Construction Co., Durham, North Car-



EXPERIENCE *builds 'em* PERFORMANCE *sells 'em*

AMERICA'S shipbuilding industry will launch more ships in 1943 than all the rest of the world combined.

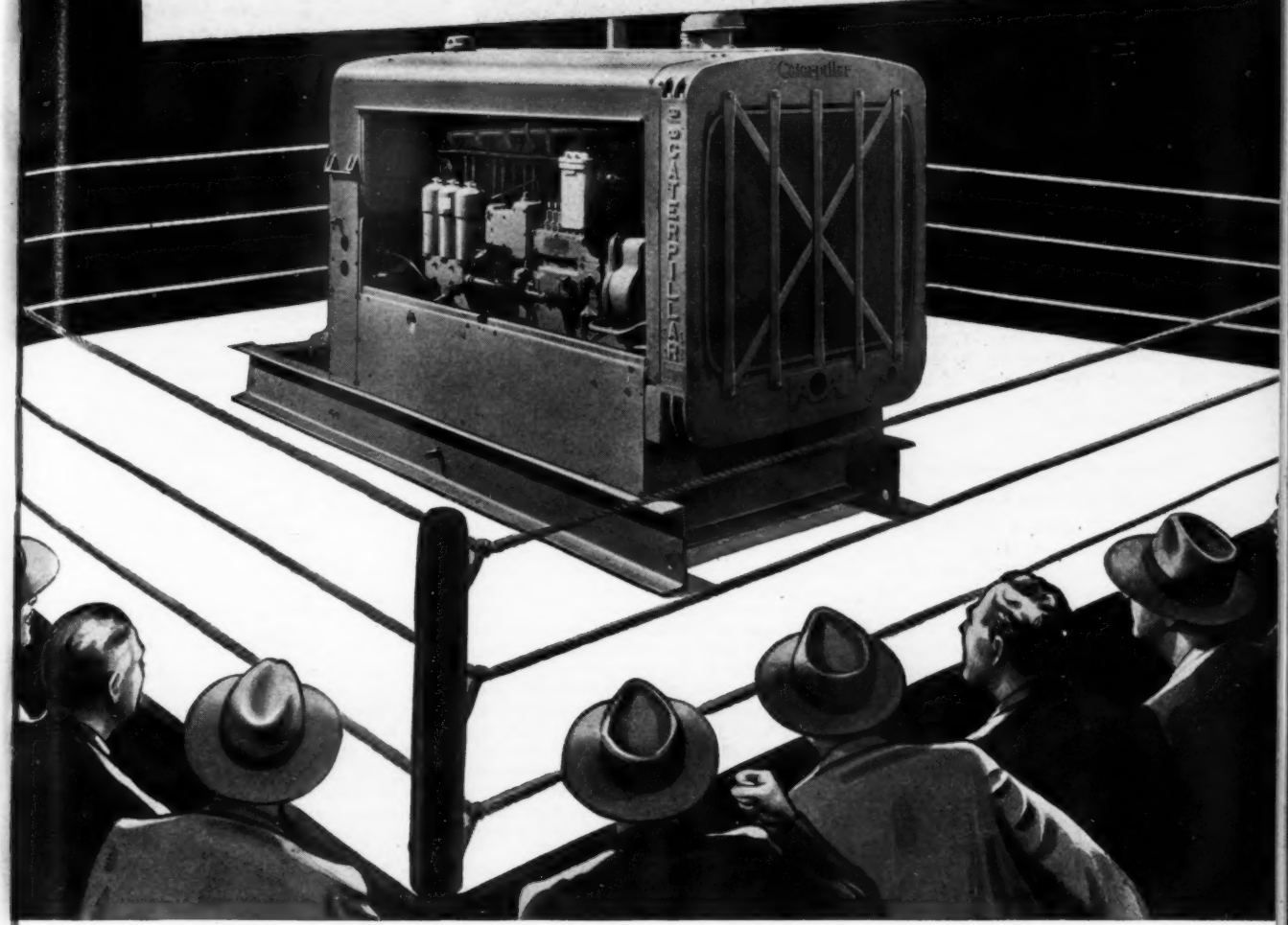
ROGERS TRAILERS are a vital link in the mass-production method of ship construction for they are transporting heavy machinery . . . boilers, bulkheads, engines . . speeding Victory ships down to the sea!

on ROGERS TRAILERS

ROGERS TRAILERS are serving efficiently on the home-front too and new models which will be available when war contracts are completed, will be even more efficient than the multitude which have been so successfully operated by industry for many years.

ROGERS BROS. CORPORATION
ALBION,
PENNA.

BARE-KNUCKLE CHAMPION



THE "Caterpillar" Diesel Engine is all-time bare-knuckle champion in its class. It packs more power and can take more punishment than any other heavy-duty engine of its size.

No other Diesel built can match the simplicity of this engine — important now, when skilled operators are scarce. It's as nearly fool-proof as an engine can be made. There are only three simple operating adjustments—valves, fan-belt and water pump.

From fan to flywheel, the whole engine is "Caterpillar"-built. The fuel system is typical of sound "Caterpillar" design and construction. It requires no adjustments whatever. It can burn any type of fuel that's handy, from cleaned crude oil out of a pipeline to high-octane gasoline. And its fuel economy is famous the world over.

"Caterpillar" Diesel Engines are built for full-load, full-time work — for more productive hours on the job and longer life. They have positive protection against dust, mud and water.

Ease of servicing is a big factor in their favor. Every part that is subject to wear can be replaced with a minimum of labor and expense.

Because "Caterpillar" Diesel Engines are used to power so many different types of equipment — such as excavators, compressors, crushers, locomotives, gravel plants and rollers — it is possible to standardize on them and thus reduce service and operating costs. And they can be hooked up in multiple installations with no loss in efficiency and definite advantages in work output.

Right now, "Caterpillar" Diesels are contributing millions of rugged horsepower to winning the war. With the coming of victory, our full production will once more be available for peacetime jobs. In the meantime, your "Caterpillar" dealer is fully equipped to keep your present machines in running order. Call on him for counsel and service. And if you are qualified to get a new "Caterpillar" Diesel, he will explain how you can apply for it.

• • •

CATERPILLAR TRACTOR CO., PEORIA, ILL.

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

TO WIN THE WAR: WORK—FIGHT—BUY U. S. WAR BONDS!

● Bucyrus-Erie 15-B crane on temporary dock unloading one of two LCT's shown in the picture. A lighter is moored at the other side of the dock.—*Official Navy Photograph.*

olina; and vice-president, H. A. Dick, president of the Gilpin Construction Co., Portland, Oregon; E. M. Rust, Washington vice-president of the Rust Engineering Co., was re-elected Secretary-Treasurer.

Discuss Construction of Irrigation Canals

Discussions which will pave the way for construction of canals to irrigate a million acres of land from Grand Coulee Dam, part of the Columbia Basin reclamation project in Washington, were opened during the week of March 12, Commissioner Harry W. Bashore of the Bureau of Reclamation announced.

Repayment contracts were discussed with directors of three irrigation districts concerned at meetings called by Regional Director Frank A. Banks, with Regional Counsel H. R. Stinson, recently named to that post, assisting him.

Commissioner Bashore also announced that several preliminary determinations that are basic to the terms of the repayment contract have been made by the Secretary of the Interior. Principal among these determinations is that $85 per irrigable acre shall be the average amount of irrigation construction costs to be paid by the water users, based on net irrigable acreage in the project. This will mean that the total amount for construction to be paid by the water users will be approximately $85,000,000.

Three other related and important determinations were made at the same time. These were: (1) that repayment contracts would be drafted to permit of the maximum development period of 10 years for each block of irrigation land, (2) that the repayment contracts would provide for the maximum repayment period of 40 years for each block of irrigation land exclusive of the development period, and (3) that the contracts would provide for the adjustment of the annual payments on a basis that reflects the current year's farm income as compared with what might be regarded as the normal farm income for that year.

In announcing these preliminary determinations, Mr. Bashore pointed out that there were several matters bearing on the repayment obligations of each of the three irrigation districts in the project yet to be determined. Among these are the determinations of the total amount each district is to assume and the manner in which the obligation is to be distributed among the irrigable lands of each district. It is expected that determinations on these matters will be made early this summer after drafting of the repayment contracts has progressed further.

South Dakota Group Joins A.G.C.

H. E. Foreman, managing director of The Associated General Contractors of America, Inc., announces the affiliation of the Highway Construction Industry of South Dakota, Inc., as the 45th highway and heavy construction chapter of the association. These 45 groups, mostly state-wide in character, embrace the vast majority of such organizations of contractors in the country. The total of all A.G.C. branches and chapters serving all types of general contractors is now increased to 90.

The Highway Construction Industry of South Dakota, Inc., includes 20 highway contractors in the state. Officers are C. A. Wagner, Sioux Falls, president; Owen Mann, Rapid City, vice president; and J. L. Materi, Rapid City, secretary-treasurer. Directors in addition to the officers are C. H. Lien, A. L. Hyde, and S. S. Roberts, Rapid City; Les Trotman, Miller; and Cecil Bartholow, Huron. Headquarters are in Rapid City.

El Salvador Is Developing Highways

El Salvador, smallest of the mainland American republics, is among the most progressive in highway matters and is the first to complete that section of the Inter-American Highway lying within its borders. Although the last 35 miles of the route is technically known as the "Pan American Highway Military Route," it completes the connection with the Inter-American highway in Honduras and will be used by the majority of the Pan-American travel.

Two other important hard-surfaced highways lead from Santa Tecla to the port of La Libertad, a distance of about 16 miles, and from San Salvador to Zacatecoluca, about 37 miles. There is now under construction the San Sal-

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WON'T QUIT
OR CAUSE TIME OUT
A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.
THE HAYWARD COMPANY
52-54 Church Street
New York, N. Y.
BUCKETS

TYPICAL DIESEL LUBRICATION PROBLEMS:

1. Port Clogging

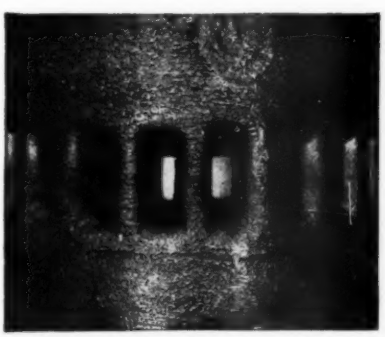
The plugging of intake and exhaust ports is frequently a factor in the operation of two-cycle Diesel engines.

Port clogging results from the combination of fuel soot with the residues of oxidized lubricating oil, which acts as a binder to plug the port openings. This clogging, of course, results in a sharp drop in efficiency.

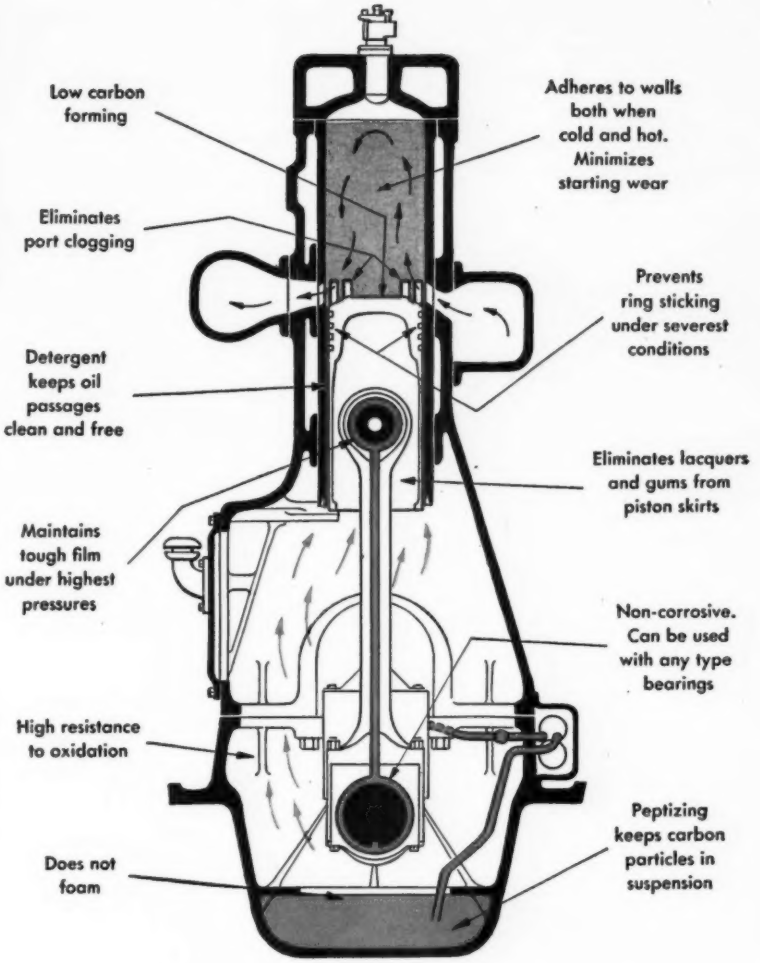
In simplified form, the deterioration of lubricating oil in an engine involves a combination of oxygen and oil at high temperatures. As the oil continues to absorb more and more oxygen, acids called "oxyacids" are produced. These oxyacids tend to polymerize or form very large, oil insoluble molecules. These form the binder for the deposits on intake and exhaust ports.

The problem, then, of eliminating these deposits may be solved by the use of a lubricating oil properly compounded to prevent it becoming a binder. RPM DELO accomplishes this in four separate ways.

1. RPM DELO is manufactured from a carefully selected base oil containing natural inhibitors highly resistant to oxygen. It contains no heavy residues which may be left behind to act as a binder for the fuel soot.



Unretouched photo shows air ports from 1000 h.p., 12-cyl., 2-cycle Diesel streamliner locomotive after being lubricated with RPM DELO for 127,590 miles. This is typical of absence of port clogging experienced when RPM DELO is used.


Low carbon forming
Adheres to walls both when cold and hot. Minimizes starting wear
Eliminates port clogging
Prevents ring sticking under severest conditions
Detergent keeps oil passages clean and free
Eliminates lacquers and gums from piston skirts
Maintains tough film under highest pressures
Non-corrosive. Can be used with any type bearings
High resistance to oxidation
Peptizing keeps carbon particles in suspension
Does not foam

Diagrammatic sketch of 2-cycle Diesel, showing the typical location of intake and exhaust ports and the advantages obtained from the use of RPM DELO.

2. RPM DELO contains a powerful oxidation inhibitor, which greatly reduces the rate at which the oil absorbs oxygen.

3. RPM DELO has chemical detergent properties. The compounding material reacts with the oxyacids to render them essentially inert so that they are no longer able to polymerize to form gums and lacquers.

4. RPM DELO has peptizing properties which enable it to maintain soot and oxidation products in suspension in minute particles. This prevents these materials from settling from the oil and forming engine deposits.

The elimination of port clogging, is, of course, only one of the valuable properties of RPM DELO. It also minimizes ring and cylinder wear, eliminates ring sticking, prevents excessive deposits on rings and will not corrode bearings.

RPM DELO has world-wide distribution and is marketed under the following names: RPM DELO, Caltex RPM DELO, Kyso RPM DELO, Signal RPM DELO, Sohio RPM DELO, and Imperial-RPM DELO (concentrate).

RPM DELO

STANDARD OF CALIFORNIA

● Allis-Chalmers tractor and Bucyrus-Erie four-wheel scraper used by the Seabees to grade an air strip on a South Pacific Island after a heavy rain. — *Official U. S. Navy Photograph.*

vador-Sonsonate-Acajutla road, about 47 miles long, which is a Class One route and will be hard-surfaced.

Large Iron Deposit Operated in Brazil

What is said to be one of the largest iron ore deposits in the world will be opened this year as a source of supply for the United Nations war plants, at Caue Peak, Brazil.

This area is easy to equip, develop and mine, and contains fifteen billion tons of ore suitable for high grade steel. Beginning this year and continuing for three years, annual planned production of one and one-half million tons of the ore will be divided between the United States and Great Britain. A 350-mile railroad from Itabira is being restored for transportation of the ore after it has been crushed, sorted and screened by power furnished by the International General Electric Company. A high transmission line is being built to Peti, a hydroelectric station 45 miles from the mine and another power source is already in operation at Bello Horizonte.

Award Contract for Coachella Canal

The J. F. Shea Company, Inc., Los Angeles, was awarded the contract for work on 22 miles more of the Coachella Canal, a part of the All-American Canal System, under the Bureau of Reclamation's Boulder Dam project. The bid price was $1,660,681.90, lowest of 11 bids submitted. The figure is $500,000 under the Bureau engineer's wartime estimate and it is also more than a quarter of a million dollars under the next low bid.

Four hundred days will be allowed for completion of this 22-mile extension which will bring the Coachella Canal to a point a few miles north of the town of Coachella.

Harbor Dredging Approved

The Board of Supervisors approved the plans for dredging Santa Monica Yacht Harbor and pumping the sand onto the Santa Monica and Venice beaches. Total cost of the work is set at an estimated $325,000. Stone groins will be built along the beach front to hold the sand pumped from the harbor.

Indiana Moves to Speed Road Plans

In order to speed up plans for Indiana's post-war highway program, engineers from district offices have been called in to the central headquarters to work until the Spring construction season opens. As in other states the Highway Department has been handicapped in the preparation of plans because of the manpower shortage.

Hunan Province to Build Highways

The Hunan (China) provincial government has decided to build 4,638 kilometers of highways in the Province this year.

Ship 16,100 Dozers for Military Service in 1943

Total shipments of angledozers, bullgraders and bulldozers in 1943 amounted to 16,100. Shipments of this machinery, which plays a vital part in military operations in all combat areas, have been increasing steadily during the past year and a quarter. Fifty percent more dozers were shipped in the fourth quarter of 1943 than in the same period of 1942. Unfilled orders increased during the first three quarters of 1943. Larger shipments in the fourth quarter 1943 and a decrease in new orders placed during that same period accounted for the smaller backlog of unfilled orders at the end of the year.

Release of quarterly shipments and

It's easier to lift, lower, push or pull the Simplex Way!

Simplex LEVER · SCREW · HYDRAULIC Jacks

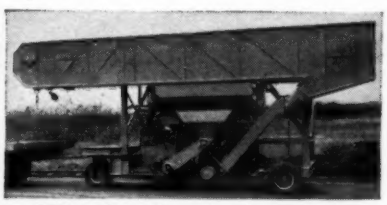
for every construction purpose

Awarded the Gold Medal for Safety

Ask for Catalog 44

Templeton, Kenly & Co., Chicago 44, Ill.

ERIE PORTABLE PLANT MAKES CONCRETE ON THE JOB



● Make 20 to 40 yards of specification concrete per hour on the job. One-man operation and a helper to handle cement bags. One hour to set up. Moves from job to job. Write for booklet.

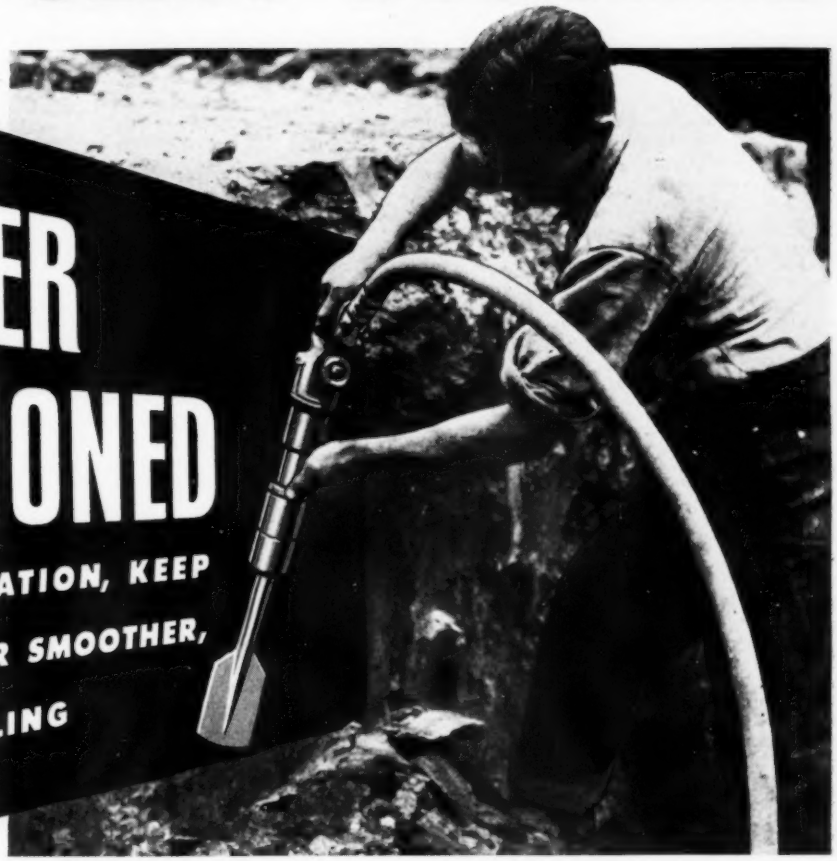
ERIE STEEL CONSTRUCTION CO · ERIE, PA.

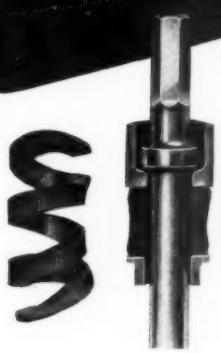
AggreMeters · Buckets · Concrete Plants · Traveling Cranes

Thor CLAY DIGGERS

RUBBER CUSHIONED

ABSORB VIBRATION, KEEP OUT DIRT — FOR SMOOTHER, FASTER HANDLING





The Thor "Pig-Tail" Rubber Bumper —deriving its name from this "pig tail" appearance when expanded, is a spiral cushion that fits around the shank of the spade as well as inside the retainer body of the tool.

★ Thor Clay Diggers are smoother handling . . . *faster operating* because they are rubber-cushioned with the exclusive Thor "Pig Tail" Rubber Bumper which absorbs the shock of every blow.

Hugging the spade shank in the retainer body of the tool, this "bumper" fits so tightly against the inside and outside diameters when pressure of the stroke is applied that it positively excludes all dirt and grit to prevent clogging.

Made of a patented synthetic rubber, it is unaffected by oil or grease, stays cooler under operation, and does not deteriorate rapidly.

For full information about these and many more features of Thor Clay and Trench Diggers and associated Thor mining and contractors' tools write today for Catalog 42-A.

Thor *Portable Pneumatic and Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. JACKSON BOULEVARD, CHICAGO 6, ILL.

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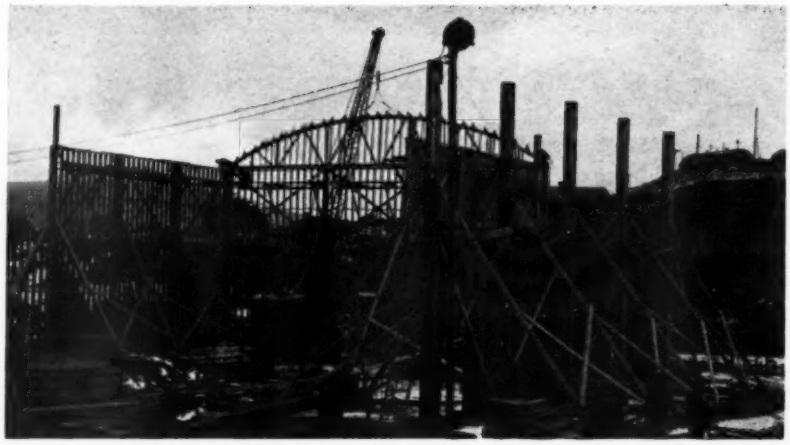
orders figures on angledozers, bullgraders and bulldozers is in line with the new War Production Board policy of wider dissemination of data which industry can use in business analysis and business planning, now that the production effort has progressed to a point where such data can no longer give any aid to the enemy.

Dozers are specialized crawler tractor attachments that include not only angledozers, bullgraders and bulldozers, but also Gradebuilders, Roadbuilders, Trailbuilders, treedozers, brushcutters, root cutters, pushdozers, and others. Their use is invaluable, both on the battlefront and on the home front in clearing land of obstructions such as trees, brush, stumps, boulders, and debris in bomber areas; in constructing new roads and airports; and in many and various other uses. The 18 companies which made shipments of dozers during 1943 accounted for approximately 99% of the total production of this machinery.



● This Bucyrus-Erie 15-B crane is being used by the Seabees for the construction of a hangar in the Aleutians. — *Official Navy Photograph.*

NUMBER OF DOZERS

Year and Quarter	Shipments	Unfilled orders (end of quarter)
1942—4th	2,960	5,210
1943—1st	3,480	9,910
2nd	3,930	11,290
3rd	4,120	14,490
4th	4,580	13,010
Total	16,110	—

New Welding Library Seen as Valuable Industrial Aid

A new library on welding, believed the most extensive in existence and one which will be of inestimable value in welding development, particularly in the industrial field, has been established at the Ohio State University, according to Mr. E. N. Manchester, university librarian.

Known as the "A. F. Davis Welding Library," it is the gift of A. F. Davis, vice president and secretary, The Lincoln Electric Company, Cleveland, Ohio. Mr. Davis received the degree of M. E. in Electrical engineering from the university in 1914 and his reason for placing the library there was the fact that Ohio State has the only four-year course in welding engineering.

Making available for the first time in one place all important literature on welding, the library will be of special value to industrial designers, engineers, technicians and others interested in research or general information on the various forms of welding and their application to design, construction, manufacture or maintenance of metal products and structures.

Not Related

Spencer Jones, Ralph Wesley Jones and Bethune Jones, authors of three separate articles in this issue of Excavating Engineer, are not related, and as far as we know, do not even know each other. It is also coincident that two of them, Spencer and Bethune, live in New York City. Ralph Wesley Jones is from Philadelphia, Pa.

OBITUARIES

JAMES FENIMORE

Mr. James Fenimore, 75, one of the organizers and a director of the Joplin-Pittsburg Railroad Company, vice-president of the Eagle-Cherokee Coal Company of Pittsburg and a director of the Bankol-Lignite Coal Company of Noonan, N. D., died at his home in Pittsburg, Kansas, February 3. His death was attributed to a heart ailment following an attack of influenza. Mr. Fenimore was engaged in the coal business, and also in farming in his community, for 40 years.

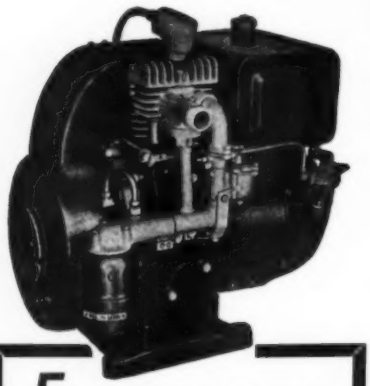
Mr. Fenimore's first venture into the coal business was with the Pittsburg-Scammon Coal Company which he organized with J. J. Stephenson and H. A. Miller. He also helped organize the Lichfield Coal Company, the Austin Coal Company and the Apex Coal Company.

He was born on December 5, 1868, in Alexandria, Indiana. He resided in several Missouri towns before moving to Pittsburg in 1918. Mr. Fenimore was married in January, 1894.

In addition to his widow, Mrs. Myrtle Fenimore, he is survived by a sister, Mrs. J. Gore, and two brothers, J. A. and W. F. Fenimore, all of Pittsburg.

Henry Dolese

Mr. Henry Dolese, president of Dolese Bros. Co., crushed stone producers, died in Oklahoma City, Oklahoma, on February 8. Mr. Dolese, with his brothers, founded the business which bears their name. He was actively engaged in the business for 45 years. Funeral services were held in Chicago.



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For Any Job—Anywhere

For a dependable source of electricity on projects remote from commercial power, Onan Electric Plants are proven leaders in the field. More than half of the armed Forces' total requirements for Power Plants are built by Onan.

Gasoline-driven . . . Single-unit, compact design . . . Sturdy construction . . . Suitable for mobile, stationary or emergency service.

Over 65 models, ranging in sizes from 350 to 35,000 watts. 50 to 800 cycles, 110 to 660 volts, A.C.—6 to 4000 volts, D.C.—Also dual A.C.-D.C. output types.

Descriptive literature sent promptly on request. D. W. ONAN & SONS, 3276 Royalston Ave., Minneapolis, Minn.

Awarded to each of the four Onan manufacturing plants.

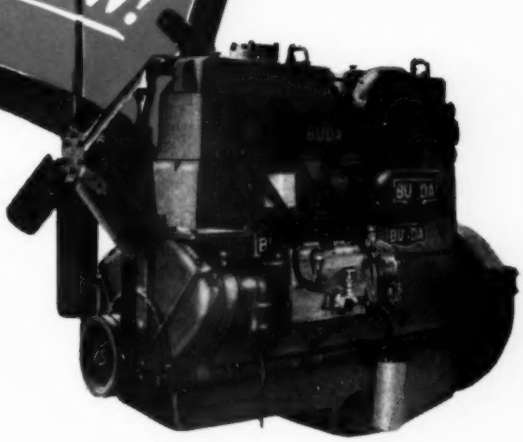
ONAN
ELECTRIC PLANTS

DON'T WAIT

. . . for costly breakdowns

BUDA

. . . start regular engine maintenance NOW!



Never was the old phrase "A Stitch in Time" more appropriate than it is today, in regard to engine care. A definite, periodic maintenance schedule will not only increase the life of your BUDA engine, but will also serve as a guide to indicate the need for minor adjustments which forestall costly breakdowns.

ORDINARY DIESELS

. . . High cylinder pressures produce sledge-hammer blows that punish pistons, rods and crankshaft every power stroke.

BUDA Low-Pressure DIESELS

Prolonged "low-pressure" combustion delivers a smooth, steady power stroke that cuts vibration, saves parts.

BUDA

THE BUDA COMPANY

15410 Commercial Avenue

HARVEY (Chicago Suburb) ILLINOIS

Field NOTES

Chemical Method of Preventing Mud

A chemical method of preventing mud by making soil waterproof has been developed by Hercules Power Company and has been proved in use on roads, airplane landing fields, and other construction projects here and abroad.

Its proper use means an end to muddy streets and roads, and a time-saving aid in road construction work where mud may cause delays. Stabinol can be used to stabilize unsurfaced dirt roads in rural areas where the traffic is light, or it can be mixed with soil that serves as the base on main highways with hard wearing surfaces.

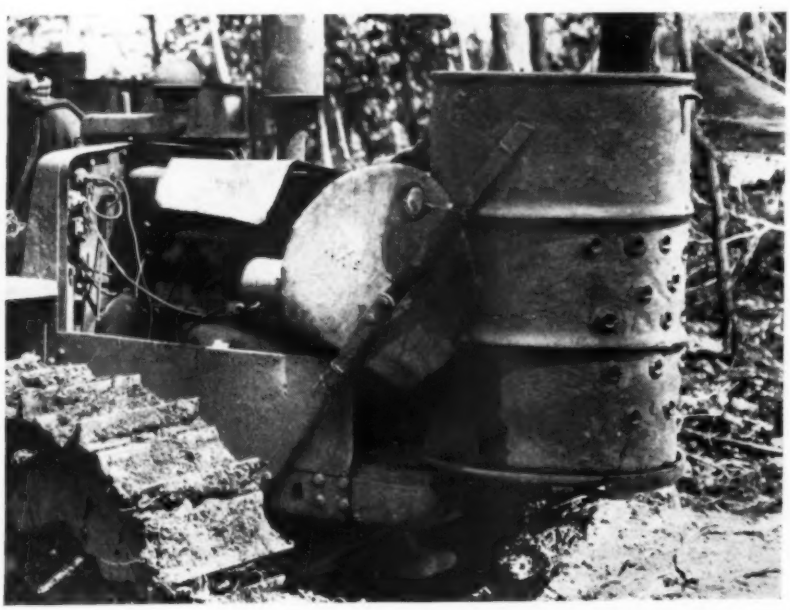
By mixing Stabinol, a resin compound, with the top few inches of soil, a waterproof surface is obtained. The water will drain off or evaporate, rather than seep through the treated soil and turn it into mud. Stabinol-treated soil resists penetration of surface water, the chemical company said, and also the capillary rise of moisture from below.

A truck can move over Stabinol-treated dirt roads during or after a rainstorm without churning up mud or digging ruts in the road. A car splashing through a puddle on this type of road will not kick up mud behind it.

The announcement climaxes several years of laboratory and field tests with various resin compounds, to achieve what is known as "soil stabilization."

Only fractional amounts of Stabinol are required, usually about one per cent of the total soil to be treated, and the "stabilized" soil has the same appearance as the original dirt. Hercules said that Stabinol does not increase the load-bearing capacity of soil, but it will prevent the soil from getting wet and thereby losing its strength.

Hercules explained in its announcement that this effect of soil stabilization will last for years. Roads laid down more than five years ago, for example, are still waterproofed.



Official U. S. Navy Photo.

● This picture shows the ingenuity of a Seabee shop in constructing a radiator which will keep this tractor in service. A Jap bomb landed near the machine and practically demolished it at Munda. After much labor and welding of transmissions, motor block and practically every other part of the machine, no radiator could be found to complete the rebuilding of the tractor. A 55-gallon oil drum was used and a few pieces of 1¼" pipe were welded into the drum to increase the cooling area. The oil drum is sealed on top with a small vent in case of overheating. This is not a most efficient or beautiful radiator; however, it has served its purpose, and the tractor is working every day with other similar tractors in hauling ordnance material and other supplies for the ordnance unit.

● For a quick method of applying paint to boards this vat equipped with two pairs of rollers is practical.

Painting Vat

A quick and practical method of applying paint to large quantities of lumber is to run the boards between two pairs of rollers, with the lower roller of each of the pairs partly immersed in a vat of paint. The lower rollers are covered with strips of carpeting and the top rollers are equipped with springs to provide the necessary tension.

JOSEPH C. COYLE

Where To (and where not to) Use Discarded Wire Rope

With Donald Nelson calling upon all American industry to boost production over the present high peak—and with the WPB putting critical steel material on an allocation basis—two obvious necessities are: increase the productivity of man and machine hours by the use of quality materials plus safe practices, and conserve steel by making present equipment last longer.

Not long ago the writer had occasion to circularize several thousand industrial engineers, and he took that opportunity to pose a couple of questions. One of those questions was: "To what use do you put discarded or retired wire rope?" The original intent of the question was to find logical ways and means for gaining extra service from a steel product which otherwise would have been sold for scrap. But the returns were both surprising and disconcerting.

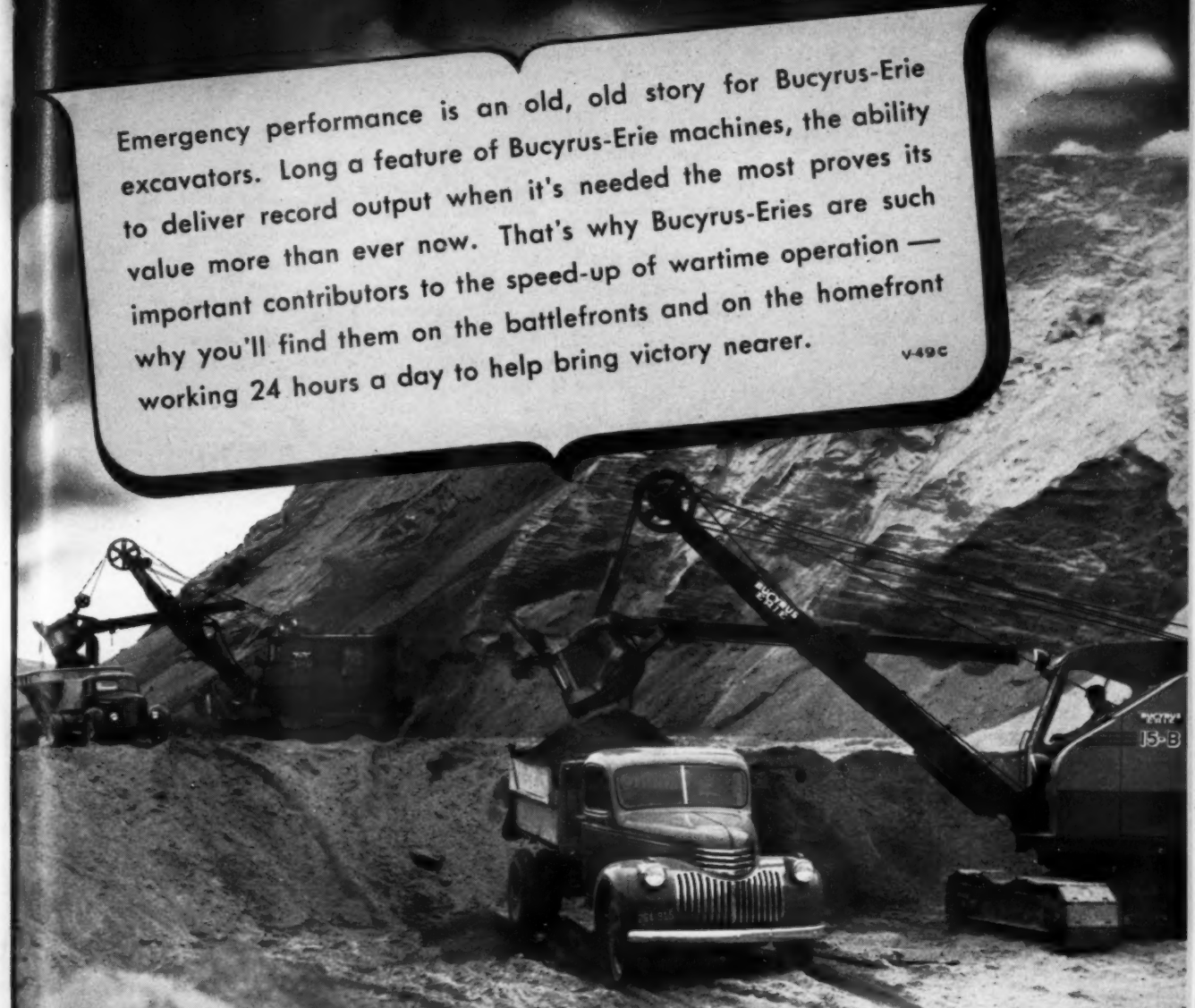
Of the 916 replies received, more than 12 per cent of them gave the startling statement that discarded wire rope was being pressed into service as slings. This answer was amazing . . . and alarming because no safety director would condone the use of worn wire rope for sling use. It is too dangerous. Why? . . . because—

There are too many variables in

DELIVERING...
When the Chips are Down

Emergency performance is an old, old story for Bucyrus-Erie excavators. Long a feature of Bucyrus-Erie machines, the ability to deliver record output when it's needed the most proves its value more than ever now. That's why Bucyrus-Eries are such important contributors to the speed-up of wartime operation — why you'll find them on the battlefronts and on the homefront working 24 hours a day to help bring victory nearer.

V-49C



Plan now to include field-proved Bucyrus-Erie quality and performance in your equipment. Whatever your excavating need, there's a Bucyrus-Erie excavator to fill it — shovels, draglines, cranes, dragshovels, etc. for low cost, high output service.

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN, U. S. A.

worn wire rope to permit of its use as a sling. Of the 114 wires in a 6 x 19 wire rope, only 72 wires are visible. It is of course possible to count the number of broken crown wires in any given length of lay to determine the retirement stage of the rope — but such visual inspection does not reveal the number of broken inner-wires — the places where the core has dried out and collapsed, the spots in the rope that have been weakened by internal corrosion, or many other factors which might make the rope dangerous as a lifting or carrying medium for loads.

Worn and discarded wire rope, in the interest of steel conservation, maintained production, and economy of operation, can, and should be, put to other uses before it is sold for scrap.

For applications where rope breakage will not result in a hazard, such as drag cables on dragline excavators, tag lines on bucket cranes, trip cables on power shovels, and drag-scraper cables, discarded rope is not out of place, provided it is of the correct diameter to fit the sheaves, and its construction provides the desired flexibility.

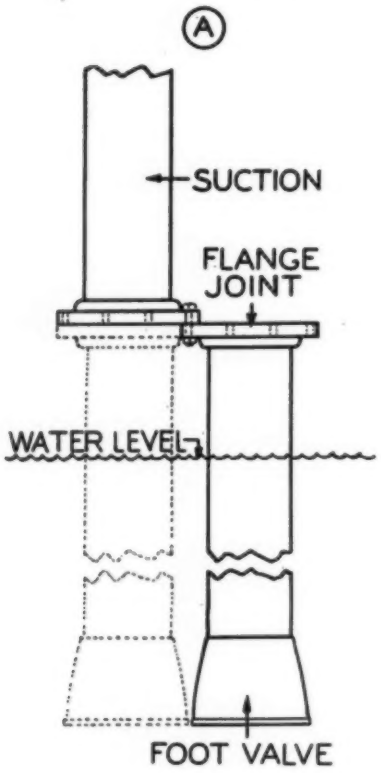
Discarded rope is also serviceable for use as temporary guys, as tow ropes and pull ropes, as guard ropes and fencing, for lashing and binding and like purposes. Where the rope has to be handled often, rope of the preformed type is less apt to injure the hands since broken wires are not inclined to stick out from preformed rope, whereas with non-preformed rope the ends of broken crown wires create jaggers, which sometimes puncture or lacerate the hands and wrists of those handling the ropes.

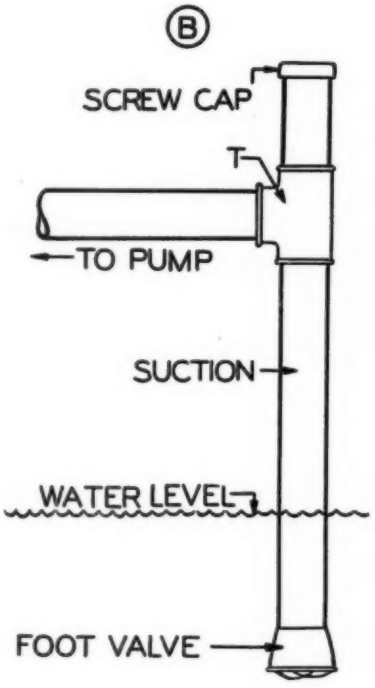
Ropes that are discarded because of abrasion, fatigue, or corrosion may be used for the purposes listed above, but they should be avoided for slings. Even where wear has occurred only along a limited length of the rope, grave chances are taken in using what appears to be the good section of the rope as sling material.

F. L. SPANGLER
(Member of American Society of Safety Engineers)

Leaky Foot Valves On Centrifugal Pumps

In many cases of excavation centrigual pumps are used for de-watering. The centrifugal pump must be full of water before it will start. It must be primed. In the more modern pumps the priming is accomplished by using special types of pumps designed to handle air as well as water and no foot valve is required. The ordinary centrifugal pump has a foot valve located at the bottom of the suction line. It is common practice on the job to fill the pump up by means of a bucket after which the pump will continue.





● Oswald Brothers Construction Company hit upon a simple method of increasing the hauling capacity of the 600 gallon tank truck in reconstruction work on Highway 99, between Whitewater and Banning, California. Two 60-gallon barrels were suspended in an angle iron frame on each side of the main tank.

The foot valve works very well where clear water is being pumped and when the pump is shut down the water remains in the line and the pump is ready to start at any time. In cases where there is considerable dirt and chips in the water, small pieces get stuck under the valve and it is often held open enough so that the water drains out and the pump must be reprimed when it is necessary to start again. It is quite a job to take the whole suction line up and clean out the valve especially if it is of large size.

In Fig. "A" the suction line is provided with a flanged joint near the high water level mark. The joint is broken at this point and a bucket of clay and sand is introduced above the foot valve. Ordinary loam will also work. The sand fills up any small openings. Water is then poured in at the joint and if it holds up, the joint is made up and the pump may then be primed in the regular way at the discharge of the pump. When the pump is started the sand is sucked up and discharged and the pump continues to operate in the regular way.

Fig. "B" indicates another connection which may be used for priming. A "T" is placed in the suction line with a cap as shown. The sand can be introduced at that point, and if the extension on the "T" is made higher than the top of the pump the whole priming operation may be made at that point. It is better to have a screw cap as it can be replaced quicker than a blank flange. It is necessary to have a tight fit so that there will be no leakage for this point is below atmospheric pressure when the pump is operating.

K. B. HUMPHREY

CRUISER CRANE

PROVIDES SPEED AND MOBILITY

Mounted on eight rubber tired wheels and driven directly from the crane engine, the "Cruiser Crane" can traverse long or short distances swiftly and easily. One man can operate the crane and drive it from job to job without leaving his seat in the operator's cab. This saves considerable time on jobs where frequent short moves back and forth are required. The "Cruiser Crane", because of its short turning radius and easy maneuverability works well in cramped quarters.

KOEHRING COMPANY *Milwaukee 10, Wis.*

• • • DEPEND ON YOUR KOEHRING DISTRIBUTOR

to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.

ARMY E NAVY

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

NOT in the *Contract*

Minister (coming up to small boy in Sunday School sitting beside his mother): "Hello, there! Who has nice fat legs."

Little Boy: "Mamma has."

Agent: "Sir, I have something here that will make you popular, make your life happier and bring you a host of friends."

Contractor: "I'll take a quart."

"What's the matter, little boy?"

"Ma's gone and drowned all the kittens."

"Dear me, that's too bad."

"Yeah, she promised me I could do it."

Sergeant: So, you complain about finding sand in your soup, eh?

Rookie: Yes, sir.

Sergeant: Did you join the army to serve your country, or to complain about the soup?

Rookie: To serve my country, sir —not to eat it!

The wife had been put on the budget plan. At the end of each month she and her husband would go over the accounts together. Every once in a while he would find an item, "L. O. K., $3," and a little further on, "L. O. K., $6."

Finally he said, "My dear, what is this—'L. O. K.'?"

"Lord Only Knows," she replied.

Professor: "Generally speaking, can you define priorities?"

Stude: "Priorities is somethin' you must write on orders to get what there isn't anything left of but."

"Have a good time at the party, daughter, and be a good girl."

"Make up your mind, mother."

The father said to his twelve year old son, "My boy, you are nearly in your teens now and I suppose it is time we talked about the 'facts of life.'"

"Suits me, pop, I think I can tell you what you want to know."

"What did your wife say when you came in intoxicated last night?"

"Nothing. And I was going to have those front teeth pulled anyway."

"So this woman shot her husband at close range with this pistol?" the coroner asked the eye-witness to the colored tragedy.

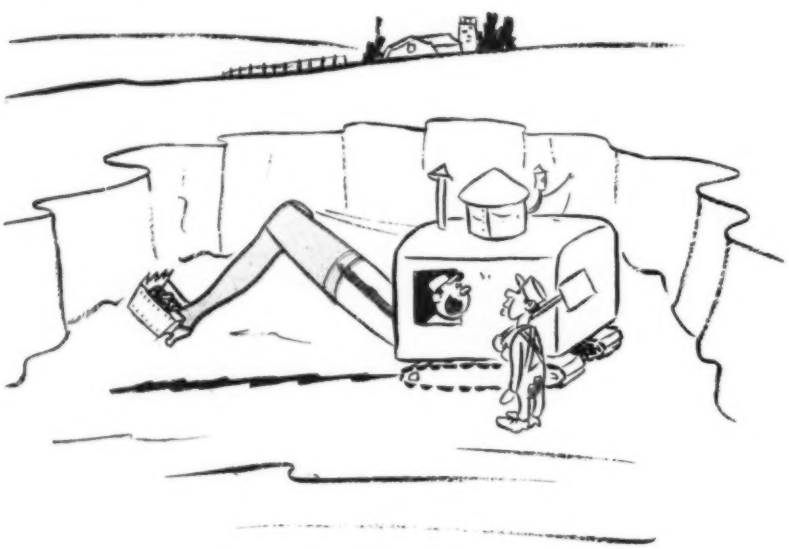
"Yessuh."

"Are there powder marks on the body?"

"Yessuh. Dat's why she shot him."

"Queer looking socks you have, one red and the other green."

"Yep, and it's funny. I have another pair at home just like 'em."



"It makes my work more interesting!"

A man went into a bar and ordered a Martini, drank it, chewed the bowl of glass up, and threw the stem over his shoulder. He continued this for about six Martinis and noticed that the bartender was staring at him.

"I guess you think I'm crazy, don't you?" he asked.

"I sure do," replied the bartender, "the stems are the best part."

"The directions say to rub the surface down with steel wool. What on earth is steel wool?"

"I'm not sure, but I think it's made from the fleece of hydraulic rams."

He: "I can't see what keeps you girls from freezing."

She: "You're not supposed to."

A New Mexico farmer is raising cactus plants so he'll have enough points.

Mrs.: "I'll never go anywhere again with you as long as I live."

Mr.: "Wh-why?"

Mrs.: "You asked Mrs. Smith how her husband was standing the heat, and he's been dead two months."

"It's easy if you use my system," replied his friend. "I just lie out there in a fox hole and yell, 'The Hell with Tojo,' and Japs appear from all directions. Then I just pop 'em off."

A little later another raid began and again the first marine got all the Japs. The unlucky one was feeling pretty low.

"Why didn't you do like I told you?" the Jap-getter wanted to know.

"I did," exclaimed the other. "I laid out there like you said and yelled, 'The Hell with Tojo.' Right away a Jap jumped up and yelled, 'The Hell with Roosevelt,' and what could I do? Jeez, I couldn't shoot a Republican!"

A sailor was cast away on a desert island. After he had been there for nine years, he awoke one morning and saw a lovely young woman floating toward the beach on a barrel. The barrel washed ashore and the woman approached.

"Hello," she said. "How long have you been here?"

"Nigh onto 10 years," said the sailor.

"Gracious," said the woman. "Then I am bringing you something you certainly haven't had in a long time."

"Well, bust my leg!" exclaimed the sailor. "Don't tell me you got beer in that barrel!"

with Buckeye CABLE control

...tractors are doing more jobs!

Photo — A Buckeye Trailbuilder and Winch grading site for Army base in Tunisia.

WITH Buckeye Power Control Units and Cable Controlled Dozers, tractors are not limited to dozing work. They are the handy men of the outfit, handling 1001 jobs on fronts all over the world.

Buckeye Winches are fast, responsive. They take hold of the load smoothly with no jerk on the line . . . cable lasts longer. Center of line pull is low to keep tractor in balance. Big clutches and brakes run cool, last longer. Single and double drum models for every tractor.

Look ahead to the benefits Buckeye Cable Control can bring you. Full data on request.

BUCKEYE TRACTION DITCHER CO.
Findlay, Ohio

See Page 165

Buckeye

Tractor Equipment
Road Wideners
Power Finegraders
Trenchers
Convertible Shovels
Spreaders

Equipment you ought to KNOW ABOUT

For further details about the equipment on these pages please write to the manufacturer, mentioning Excavating Engineer.

Horizontal Vibrating Screen

Manufacturer: The Iowa Manufacturing Company, Cedar Rapids, Iowa.

Claims: The company features the Cedarapids Horizontal Vibrating Screen as the first full-floating screen with no transmission of vibrations to the subframe and with directional vibration forces that cannot become unbalanced. The motor, driven by a V-belt drive and replaceable by a countershaft, if desired, is mounted to one side of the frame on a detachable platform.

A number of other advantages are claimed for the screen. When installed on a portable plant it gives complete access to either roll or jaw crusher by simply removing the crusher hopper. Used on a portable plant it reduces to a minimum the weight added by such an installation. It operates flat, moving the material by action of the screen rather than by gravity, and thus affords more accurate control over the screening.

Cedarapids Horizontal Vibrating Screens are available in a variety of sizes, single, double, or triple deck, ranging from 2'x4' to 4'x4'.

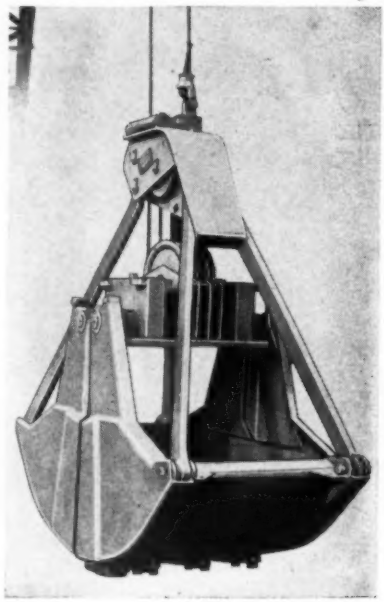
All-Welded Clamshell Bucket

Manufacturer: C. S. Johnson Company, Champaign, Ill.

Claims: One of the major operating advantages of this bucket is a renewable manganese steel lip to provide many times the wear of ordinary mild steel construction. Closing sheaves are equipped with needle bearings which are protected against dirt and moisture by special synthetic rubber seal. To prolong rope life, sheaves are of large diameter and guide sheaves have been substituted for guide rollers.

All welded construction makes digging easier and faster for there are no external bolt heads or rivets to slow up the operation. The welded design also permits greater stability since the weight can be exactly distributed.

Subject to required government authorization, general purpose buckets are available for immediate delivery in the following sizes: ½-cu. yd. to 2½-cu. yds.; rehandling buckets from ½-cu. yd. to 2½-cu. yds., and heavy digging from ½-cu. yd. to 1½-cu. yds. capacities.



Engine Drive Arc Welder

Manufacturer: The Lincoln Electric Company, Cleveland, Ohio.

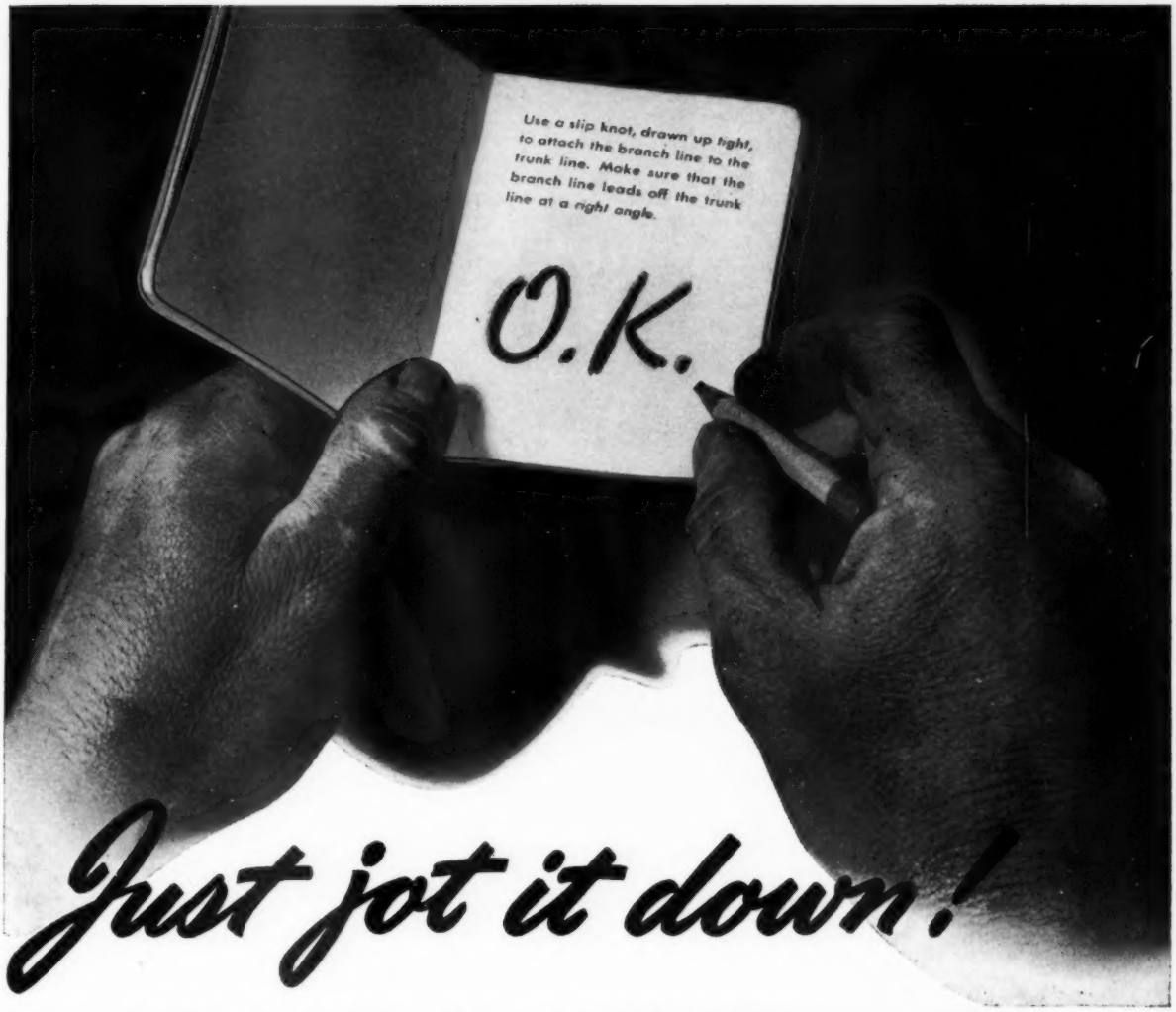
Claims: A new "Shield-Arc" engine-driven welder rated at 200 amperes with a current range of 40 to 250 amperes with a dual control of welding current accomplished by adjustment of series fields and generator speed. For metallic arc welding, with bare or coated electrodes, the new model also supplies uniform welding current for carbon arc welding. The generator control, or "job selector" assures accuracy of open circuit voltage and permits precise control of engine speed of from 500 to 1,150 rpm for welding. In addition, this control may be used to manually reduce engine speed to as low as 750 rpm whenever it is necessary to stop welding at intervals of a few minutes.

Weight of the unit is approximately 1,130 pounds; overall length, 65¼ inches; width, 24 inches, and height, 41½ inches. The generator can produce its rated current of 200 amperes when the "job selector" is set so that the machine operates at speeds as low as 1,200 rpm.

Safe-Line Wire Rope Clamp

Manufacturer: National Production Co., Detroit, 13, Mich.

Claims: The clamp is made in two halves. The inside of each half is made to fit the rope; the large grooves pocket each small wire that makes up the strands; the large grooves hold the rope from end-wise slippage and the small grooves prevent the rope from spiral winding out of the clamp. Every strand and every surface wire contacts the full length of the clamp. The two halves are gripped tightly on the rope with strong alloy steel nuts. The hold contact is firm and complete the full length and circumference of the clamp.


Use a slip knot, drawn up tight, to attach the branch line to the trunk line. Make sure that the branch line leads off the trunk line at a right angle.
O.K.

Just jot it down!

IT'S SOMETHING TO REMEMBER — EVERY DAY

Using Primacord Detonating Fuse is as simple as A, B, C. There are a few rules, naturally — but nothing really complicated.

The use of Primacord has many advantages, especially at this time. It produces more work from explosives, because it acts as the detonator for every cartridge in the hole. It connects all holes, permitting the planning of shots for better fragmentation. It simplifies loading, especially in decks. It is an insensitive material that must be detonated; therefore, its use promotes safety. It is light in weight, strong, waterproof, easily handled and used. Send for the Primacord Book.

PRIMACORD-BICKFORD
Detonating Fuse
Manufacturers of Safety Fuse since 1836

THE ENSIGN-BICKFORD COMPANY • SIMSBURY, CONNECTICUT

Notes from the manufacturers

Independent Pneumatic Tool Company, of Chicago, Ill., announces that Neil H. Hurley was elected chairman of the board of directors and Neil C. Hurley, Jr., was elected president. Edward G. Gustafson, treasurer of the company, and John McGuire, secretary, were elected to the board of directors. The company also announces a net profit for 1943 of $2,074,039, or $5.52 per share before deducting contingency reserves of $900,000, as compared with a net profit of $1,611,636 in 1942, or $4.29 per share before deducting a contingency reserve as compared with $5,023,558 in 1942. A dividend of 50 cents a share was declared payable on March 29 to stockholders on record on March 16.

Chicago Pneumatic also announces the appointment of Beckwith Machinery Company of Pittsburgh, Pa., as distributors for its complete line of contractor's equipment.

Bucyrus-Erie Company of South Milwaukee, Wis., reports earnings for the year ended December 31, before federal and state income taxes and a special contingency reserve, amounted to $11,105,796, or approximately 33 per cent greater than in 1942. After normal reserves and other deductions, the earnings were $2,904,796, out of which a contingency reserve of $800,000 was set aside and the resulting consolidated net income for the year amounted to $2,104,796, an amount equivalent to the full dividend of $7.00 per share on preferred and $1.39 per share on common stock. Shipments during 1943 were in excess of 35 per cent over those of 1942 and new orders in 1943 were about 15 per cent less than in 1942. Unfilled orders remained the same as at the end of 1942.

Regular dividends amounting to $390,649 were paid on preferred stock throughout the year. Dividends aggregating 60 cents a share, $741,133, were paid throughout the year on common stock.

R. G. LeTourneau, Inc., of Peoria, Illinois, announces that it is forming its own exclusive sales distribution organization. E. R. Galvin is general sales manager; Harry L. Vines, Western sales manager, and Paul Fulford, export sales manager. Other district sales managers are: Howard L. Stilley, Central, and H. R. Conn, Eastern. All but Vines are headquartered in Peoria.

John F. Johannsen, LeTourneau's export general manager, has been named assistant general sales manager, to advise on export sales. Robert D. Evans, formerly assistant, has succeeded Stilley as chief field engineer, and Bruce Royer, formerly with the U. S. Engineers, Chicago offices, is Evans' assistant.

Also in the making are adjustments in LeTourneau's district representatives' staff. Veteran "DR's" assisting in the new organization program include Louis D. LeTourneau of Portland, Ore.; M. E. Miller, Atlanta, Ga.; R. E. Pendleton, Denver, Colo.; J. E. Blanch, Utica, N. Y.; B. B. Brown, Minneapolis, Minn.; Paul King, formerly of the LeTourneau export department and now district representative in Los Angeles, and E. M. Ferguson, advanced from Los Angeles to Stockton to be assistant Western manager.

Already added to the district representatives' staff with assignments forthcoming are: John Ralls of Memphis, Tenn., and C. W. Scholvin, a construction veteran who has been with the WPB in Washington.

LaPlant-Choate Manufacturing Company, Inc., of Cedar Rapids, Iowa, announces that H. H. Buchanan, formerly assistant general sales manager and acting export manager for the Thew Shovel Company, has been appointed general sales manager. He succeeds H. N. Graves, who resigned last June.

Mr. Buchanan began his administractive career as a sales representative for Bucyrus-Erie Company in 1923. In 1936 he joined the Caterpillar Tractor Company as a special representative and in 1939 he became Western district sales manager for Thew-Lorain.

American Chain and Cable Company Plant of Hazard Wire Rope, Wilkes-Barre, Pa., was awarded the Army-Navy "E" for excellence of production.

International Harvester Company, Chicago, Ill., announces that T. B. Hale and F. W. Jenks have been elected vice-presidents by the board of directors. Fowler McCormick, president, announced the formation of four new divisions of the Harvester Company together with the general managers who will direct them. The new divisions and their general managers are: Farm tractor division, R. C. Archer; Farm implement division, R. P. Messenger; Industrial power division, H. T. Reishus, and Fibre and twine division, Neil Loynachan. A. J. Peterson, formerly assistant manager of domestic sales, was appointed manager of the general line sales department.

Fruehauf Trailer Company, Detroit, Mich., announces the appointment of Roy A. Fruehauf as executive vice-president.

Westinghouse Electric International Company, New York, announces that Edward J. Herzog, recently returned from Venezuela where he was regional supervisor for the Caribbean area, has been appointed manager of the oil and mining division.

New trade literature

Title: **"How the G-E Amplidyne Improves Electric-Shovel Operation"**

Subject: An eight-page illustrated pamphlet explaining advantages of amplidyne control, a comparison with conventional control and operating experience.

Where to Get: General Electric Co., Schenectady, N. Y. (Free)

Title: **"Euclid Operator's Handbook"**

Subject: Pocket size handy reference book giving operating suggestions and instructions to provide bottom-dump and rear-dump Euclid operators with a better understanding of the proper care and efficient operation of their equipment. The book deals principally with the 13-yd. bottom dump and 15-yd. rear dump models, but details are given for other models and in many instances the data and text apply as well to them.

The book is profusely illustrated with photographs and charts. Included is general information, helpful hints, useful data (miscellaneous tables) and safety hints.

Where to Get: The Euclid Road Machinery Co., Cleveland, 17, Ohio. (Free to owners and operators of Euclid equipment.)

Title: **"How to Pump It"**

Subject: Complete information concerning the mechanical parts and construction of pump, how they operate, what they will do. Specification and capacity charts are included in the 20-page illustrated catalog.

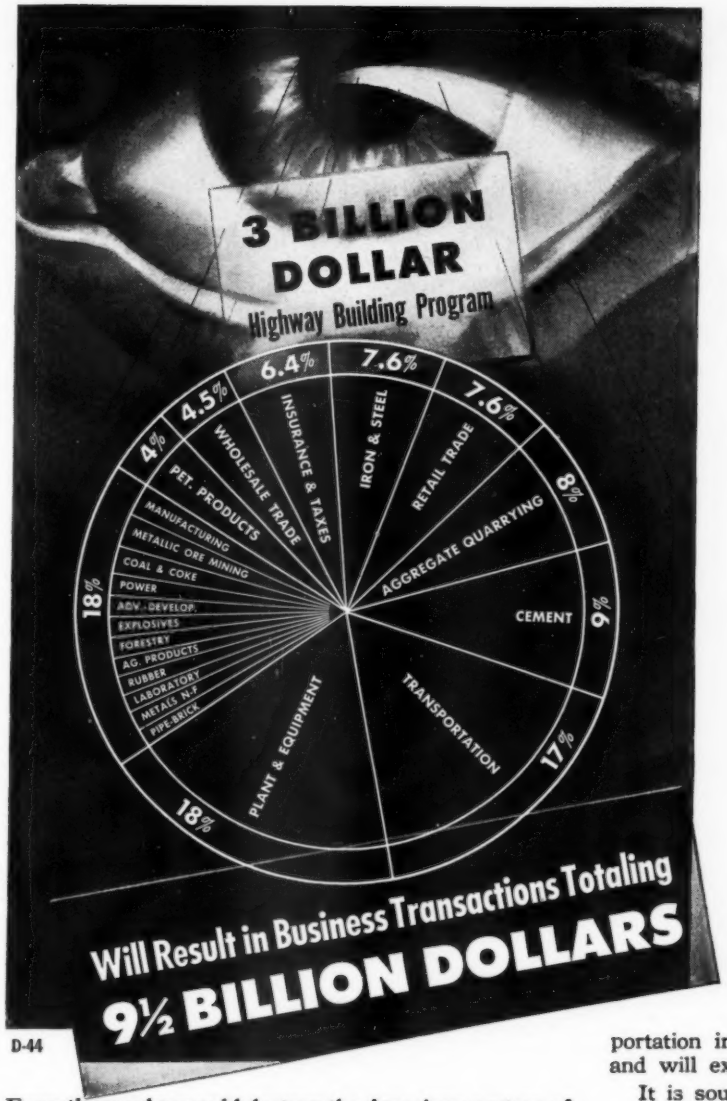
Where to Get: Chain Belt Co., 1600 West Bruce Street, Milwaukee, Wisconsin. (Free)

Title: **"New Hayward Bucket Guide"**

Subject: In a new 16-page vest-pocket guide on its complete line of digging and rehandling buckets, The Hayward Company announces that it is preparing to make quick shipments of buckets by air just as soon as cargo planes are available for carrying civilian freight.

This illustrated factual publication is designed for the busy operating man who wants a quick picture of the improved types of buckets now available, the uses for which each is recommended, the capacities and sizes obtainable. Information and data are given on rehandling and digging clamshell, electric motor, standard and multi-power orange peel, sewer catch basin buckets, and automatic take-up reels and grapples for a wide variety of materials such as tiered wood, manure, rocks, tree trunks and pulp wood.

Where to Get: The Hayward Company, 50 Church Street, New York, N. Y. (Free).



D-44

$s × $s = Worthwhile Jobs

Giant Stride to Keep Free Enterprise FREE

PROPOSED BY AMERICAN ROAD BUILDERS' ASSOCIATION

Even those who would destroy the American system of free enterprise must credit it with the greatest war production record the world has ever known.

But, that is not enough to keep free enterprise free. No segment of industry can afford to relax when the pressure of war is off. Nothing short of full employment will make freedom of enterprise secure through many difficult post-war years.

Because it is a basic and a giant stride toward this "must" goal, we urge all industry to get behind and push forward the planned peacetime program of the American Road Builders' Association.

It is sound because its proposed 3 billion dollar annual investment in highways multiplies to eventually result in business transactions totaling 9½ billion. (See chart above based on studies by U. S. Public Roads Administration.)

It is sound because it is capable of directly employing 3 million persons quickly and of contributing indirectly to the supporting of many more million jobs. (The highway transportation industry alone normally employs 7,000,000 and will expand with highway construction.)

It is sound because the economic structure of the country is built around the motor vehicle and will become more dependent upon it. Gasoline rationing forcibly brought this fact home.

It is sound because our highway system is inadequate, has suffered from heavy war traffic, weathering and limited maintenance.

It is sound because registration fees, gasoline taxes, municipal and county taxes, Federal user taxes, personal property taxes and tolls, if all used for highway purposes, would eventually be sufficient to build and maintain the highway system.

It is sound because it provides for competitive bids by contractors of experience. This insures higher efficiency, better construction at lower costs than can be obtained by the force account system of work relief.

The American Road Builders' Association, 1319 F St. N. W., Washington 4, D.C., has made a fourth printing of a 64-page book entitled "A Sound Plan for Postwar Roads and Jobs." We suggest that every American write for it—to the Association direct or to—

union Wire Rope corporation

Tulsa • Houston • Chicago • Salt Lake City • New Orleans 2141 Manchester Ave., KANSAS CITY, MO. Monahans, Tex. • Portland, Ore. • Ashland, Ky. • Atlanta

● This could well be the model-maker's dream. Sites for hydro developments, dams, canals, reclamation, irrigation, areas inundated by proposed dams, etc., are instantly revealed. The reliefograph, a machine that "reliefs" in true vertical scale a topographical map that has been photographed onto a thin aluminum plate, is shown to a Pan-American delegation. Each contour, gully, depression, hill, etc., appears in true and accurate scale.

Planning . . .

(Continued from page 181)

seen, ninety (90) percent of all contours shall be within one-half contour intervals of true position and no contour shall be more than one contour interval from true position. In areas where the ground is not visible because of timber cover, the contours shall be interpolated from those spots where the ground is visible and shall be shown by dash rather than full lines.

c. All planimetric detail visible on the aerial photographs and the outline of timber areas shall be shown on the finished map.

4. *Materials to be Delivered.*—a. The contour maps shall be film negative reproductions of the original hard copy compilations. A proposed sheet lay-out shall be submitted to the District Engineer for approval or alteration prior to beginning the map drafting.

b. Two (2) copies of photographic index maps of the aerial survey and one (1) copy of each aerial photograph needed to cover the area stereoscopically shall be furnished. These aerial photographs shall be on double weight semi-matte paper.

c. All field notebooks used in the map work or a copy of the notes therein shall be furnished with the completed map.

5. *Commencement and Completion.*—a. The flying shall be accomplished on the first suitable day after foliage is off the deciduous trees, and after the necessary permit to photograph the area has been obtained from the Eastern Defense Command.

b. Final delivery of all maps shall be made 45 days after completion of photography.

● The Pan-American delegation examines a precise aerial camera built to produce least weight with required ruggedness. They weigh 35 pounds empty. Roll of film 180' long weighs about ten pounds.

Cayce Quarry . . .

(Continued from page 176)

grading overburden to expand the stock piles of stone.

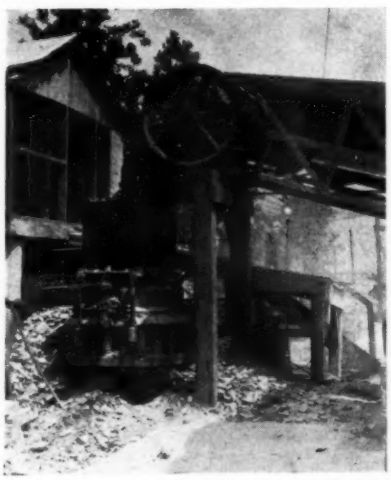
Since there is no outlet from the quarry except up, special provisions must be made for removal of water, otherwise The Weston & Brooker Company would be the proprietors of the deepest swimming pool in the South. Constant removal of seepage and rain water is attended to by an automatically controlled, electrically operated centrifugal pump located beside a sump pool on the quarry floor.

● Rear side view of "Dinny", a portable counterweighted boom on pneumatic tires used to raise and hold men, wagon drills, jackhammers and drill steel when there is work to be done on ledges and other rocky protrusions high up on the quarry face.

More than 100 men are employed at the Cayce plant of The Weston & Brooker Company, under the direction of A. K. Rucker, superintendent. W. S. Weston is president of The Weston & Brooker Company; W. B. Jamison is vice-president; W. L. Blackwell, manager of all operations; Richard Simons, sales manager; W. S. Weston, Jr., now an Army officer, assistant superintendent, and L. J. Burriss, chief engineer of all operations.

The Weston & Brooker Company also owns and operates another crushed granite plant at Camak, Georgia, some 125 miles away. Here, different production problems have resulted in correspondingly different operations which were presented in the July, 1942, issue of Excavating Engineer.

● Three-foot Symons cone crusher.



9 Items to Check When Ordering Wire Rope

(Note: Every day, several orders are received which require correspondence and delay because of insufficient information.

Listed below are items which can be used as a wire rope specification check list. Because wire rope is a controlled material, CMP allocation or symbol, also certification, must be included before orders can be entered.)

WIRE ROPE CHECK LIST

Item	*Example*
1. Length	120 Feet
2. Diameter	¾ Inch
3. Number of Strands	6
4. Number of Wires per Strand	19
5. Lay	Right Lang Lay
6. Core	IWRC
7. Kind of Fabrication	PREformed
8. Grade	(Improved Plow Steel) Monarch Whyte Strand
9. Use	Make, Model of Equipment

(Plus . . . CMP allocation or symbol, also certification.)

Here are all these items for this order.

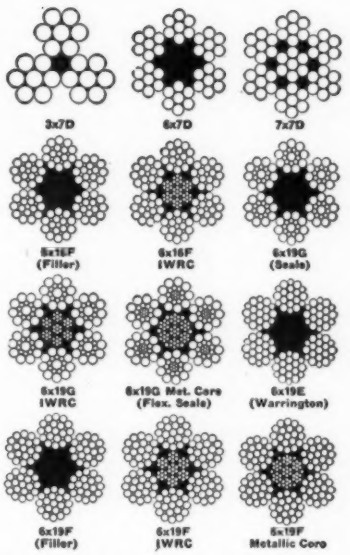
120 feet ¾-inch 6 x 19 Right Lang Lay with IWRC PREformed Monarch Whyte Strand Wire Rope, to be used for hoist line on Model 45 Lorain Skimmer.

Note: For more complete detailed information on how to specify wire rope, refer to Macwhyte G-15 Wire Rope Catalog, pages 89 to 101.

The above check list is normal and complete as to the specifying of wire rope in peacetime, but it is more important than ever in wartime when it is so difficult to get wire rope.

STATE USE FOR ROPE—IT HELPS

Always include the type of service for which the rope is wanted. Then if an error is made in listing the proper construction, or if our experience has shown a different construction gives better service for this purpose, we may be able to help you obtain a better rope. In some cases such information today, makes possible your getting a wire rope to meet your needs when the rope you specify is not available but a similar one is available that might do an even better job for you at no additional cost.



These are but a few wire rope constructions taken from our G-15 Wire Rope Catalog to indicate the vast number of types and constructions of wire rope that are made. As wire rope manufacturers, we are in a position to help wire rope users obtain the correct rope for their specific needs.

HOW TO MAKE SURE OF CORRECT ROPE FOR YOUR EQUIPMENT

There are hundreds of different sizes, grades, and constructions of wire rope. For many years we have cooperated with wire rope users to get the correct ropes for all kinds of equipment. We have watched these ropes give outstanding service on equipment like yours.

The benefit of that experience may help make your wire ropes last longer, or may help you in specifying what we believe is the finest wire rope you can buy — the *correct* rope for *your* equipment: Monarch Whyte Strand PREformed.

Monarch Whyte Strand PREformed has recorded outstanding service records because:

It's made from selected steels.

It's PREformed to reduce internal stresses and to fight rope fatigue.

It's internally lubricated to protect wires and strands against corrosion and friction.

MACWHYTE
PREformed
WIRE ROPE
***Plus* Internal Lubrication**
Selected Steels
Tested—Proved
The correct rope for your equipment

NO. 708

MACWHYTE COMPANY

ARMY E NAVY

WIRE ROPE MANUFACTURERS

The correct rope for your equipment

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Causes and Cures

of 14 common welding troubles

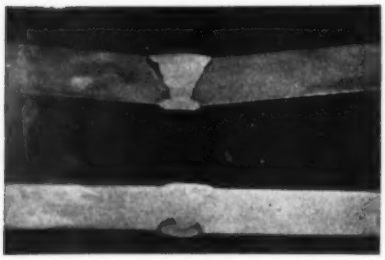
By C. H. JENNINGS

(Welding Engineer, Research Lab., Westinghouse Electric and Manufacturing Company)

THERE are many fabricating difficulties encountered in the arc welding of any structure. Some of these difficulties seriously effect the strength and serviceability of the ultimate structure while others are less important and only influence the cost or appearance.

The correction of these troubles is generally not difficult providing the welding operator or engineer has a knowledge of the conditions causing them. In order to assist in detecting and correcting these undesirable factors, 14 of the more common troubles are illustrated by photographs and discussed from the standpoint of causes and methods of correction.

DISTORTION



● **Top: Angular distortion obtained with single vee butt joint not properly prepared or clamped. Bottom: Single vee butt joint free from angular distortion, accomplished by proper clamping.**

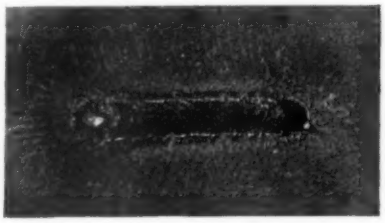
Cause

A Shrinkage of deposited metal pulls parts together and changes relative positions.
B Non-uniform heating of parts during welding causes them to distort before welding is finished. Final welding of parts in distorted position prevents the maintenance of proper dimensions.
C Improper welding sequence.

Cure

A Properly clamp or tack parts to resist shrinkage.
B Pre-form parts sufficient to compensate for shrinkage of welds.
C Distribute welding to prevent excessive local heating. Pre-heating desirable on some heavy structures.
D Removal of rolling or forming strains before welding is sometimes helpful.
E Study structure and develop a definite sequence of welding.

WELDING STRESSES



● **Lines radiating from the weld are located where the mill scale has cracked off of the plate because the residual stresses produced by the weld shrinkage has exceeded the yield point of the material.**

Cause

A Joints too rigid.
B Improper welding sequence.
C Inherent in all welds, especially in heavy parts.

Cure

A Slight movement of parts during welding will reduce welding stresses.
B Make weld in as few passes as practical.
C Peen each deposit of weld metal.
D Anneal finished product at 1100-1200°F. for one hour per inch of thickness.
E Develop welding procedure that permits all parts to be free to move as long as possible.

CRACKED WELDS

● **Cracked weld caused by rigid joint.**

Cause

A Joint too rigid.
B Welds too small for size of parts joined.
C Poor welds.
D Improper preparation of joints.
E Improper electrode.

Cure

A Design the structure and develop a welding procedure to eliminate rigid joints.
B Do not use too small a weld between heavy plates. Increase the size of welds.
C Do not make welds in string beads. Make weld full size in short section 8" to 10" long.
D Welding sequence should be such as to leave ends free to move as long as possible.
E Insure that welds are sound and the fusion is good.
F Preheating parts to be welded sometimes helpful.
G Prepare joints with a uniform and proper free space. In some cases a free space is essential. In other cases a shrink or press fit may be required.

WARPING
(Thin Plates)

● **Overlapping: Warped thin plate, improper tacking and welding procedure. Underneath: This plate free from warping, properly tacked and clamped, welded by skip and slip-back method.**

Cause

A Shrinkage of deposited weld metal.
B Excessive local heating at the joint.
C Improper preparation of joint.
D Improper clamping of parts.

Cure

A Select electrode with high welding speed and moderate penetrating properties.
B Weld rapidly to prevent excessive local heating of the plates adjacent to the weld.
C Do not have excessive spaces between the parts to be welded.
D Properly clamp parts adjacent to

the joint. Use back up to cool parts rapidly.
E Use special welding sequence; step back or skip procedure.
F Peen joint edges slightly before welding. This elongates edges and the weld shrinkage causes them to pull back to the original shape.

UNDERCUT

● **Right: Undercut on fillet weld. Left: Good fillet weld complete penetration flat face and no undercut.**

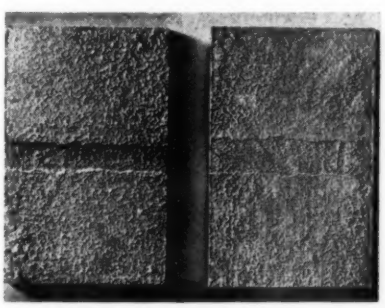
Cause

A Excessive welding current.
B Improper manipulation of electrode.
C Attempting to weld in a position for which the electrode is not designed.

Cure

A Use a moderate welding current and do not try to travel too rapidly.
B Do not use too large an electrode. If the puddle of molten metal becomes too large, undercut may result.
C Excessive weaving will cause undercut, consequently it should not be used.
D A uniform weave will aid greatly in preventing undercut in butt welds.
E If an electrode is held too near the vertical plane when making a horizontal fillet weld, undercut may be obtained on the vertical plate.

CORROSION



● **Left: Corrosion of welded joint (HNO_3). Note weld is almost comparable to parent metal. Right: Improper electrode causes poor corrosion resistance of weld (HNO_3).**

Cause

A Type of electrode used.
B Improper weld deposit for corrosive media.
C Metallurgical effect of welding.
D Improper cleaning of weld.

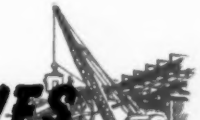
Cure

A Bare type electrodes produce welds that are less resistant to corrosion than the parent metal.
B Shielded arc type electrodes produce welds that are more resistant to corrosion than the parent metal.
C Do not expect more from the weld than you do from the parent metal. On stainless steels use electrodes that are equal to or better than, the base metal.
D When welding 18-8 austenitic stainless steel be sure the analysis of the steel and welding procedure is correct so that welding does not cause carbide precipitations. This condition can be corrected by annealing at 1900-2100°F.
E Certain materials such as aluminum require careful cleaning of all slag to prevent corrosion.

(Continued on page 222)

SPEEDS UP WORK

SAVES MATERIAL



THE Construction Industry can well be proud of its wartime production record. Its high-operating efficiency — developed during peace —had much to do to bring the war to its "final phase".

In keeping with a well-established American principle, the contractors of this country have long been quality-conscious about their production tools. This demand for greater efficiency through quality equipment is reflected in the widespread acceptance of "HERCULES" (Red-Strand) Wire Rope in the construction field.

Confidence in "HERCULES" (Red-Strand) Wire Rope is well-founded, as it is a product of long experience — designed and manufactured to do specific jobs better . . . safer . . . more economically. It is available in both Round Strand and Flattened Strand constructions as well as in Preformed and Non-Preformed types. There is —in this one grade—a right rope for every heavy duty purpose.

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BRITTLE JOINTS

● Ductile and brittle joints.

Cause

A Air hardening base metal.
B Improper preheating.
C Unsatisfactory electrode.

Cure

A When welding on medium carbon steel or certain alloy steels the heat affected zone may become hard as a result of rapid cooling. Preheating at 300-500°F. should be resorted to before welding.

B Multiple layer welds will tend to anneal hard zones.

C Annealing at 1100-1200°F. should, after welding, generally soften hard areas formed during welding.

D The use of austenitic electrodes is sometimes desirable on steels which harden readily. The increase weld ductility compensates for the brittle heat affected area in the base metal.

SPATTER

● Left: Weld made with proper current and arc length, note absence of adhering splatter. Right: Weld made with excessive current and arc lengths, note excessive splatter and poor appearance.

Cause

A Inherent property of some electrodes.

B Excessive welding current for the type or diameter of electrode used.

C Excessively long arc.

D Arc blow.

Cure

A Select proper type of electrode.

B Do not use excessive welding current.

C Hold proper arc length.

D Reduce arc blow.

E Paint parts adjacent to weld with white wash. This prevents spalls from welding to parts and makes removal easy.

MAGNETIC ARC BLOW

● Arc blow at end of joint.

Cause

A Magnetic fields cause the arc to blow away from the point at which it is directed. Magnetic blow is particularly noticeable with d-c at ends of joints and in corners.

Cure

A Proper location of the ground on the work. Placing the ground in the direction the arc blows from the point of welding is often helpful.

B Separating the ground in two or more parts is helpful.

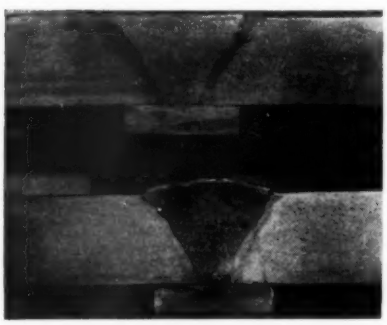
C Weld toward the direction the arc blows.

D Hold a short arc.

E Change magnetic path around arc by using steel blocks.

F Use a-c welding.

POROUS WELDS



● Top: Sound butt weld. Bottom: Porous butt weld caused by short arc and insufficient puddling.

Cause

A Inherent property of some electrodes.

B Not sufficient puddling time to allow intrapped gas to escape.

C Poor base metal.

D Too short an arc length.

Cure

A Some electrodes inherently produce sounder welds than others. Be sure the proper electrodes are used.

B Puddling keeps the weld metal molten longer and often insures sounder welds.

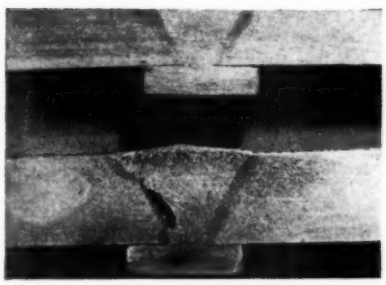
C A weld made of a series of strung beads is apt to contain minute pinholes. Weaving will often eliminate this trouble.

D Do not use excessive welding currents.

E In some cases the base metal may be at fault. Check this for segregations and impurities.

F Do not hold too short an arc.

POOR FUSION



● Top: Good butt weld complete fusion and penetration. Bottom: Butt weld with poor fusing and slag inclusions on side, improper weaving procedure and low welding current.

Cause

A Improper diameter of electrode.
B Improper welding current.
C Improper preparation of joint.
D Improper welding speed.

Cure

A When welding in narrow vees use an electrode small enough to reach the bottom.

B Use sufficient welding current to deposit the metal and penetrate into the plates. Heavier plates require higher current for a given electrode than light plates.

C Be sure the weave is wide enough to melt thoroughly the sides of a joint.

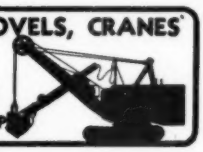
D The deposited metal should tend to sweat onto the plates and not curl away from it.

(Continued on page 224)

TO ADVERTISE: All advertising in this section is payable in advance. Rate: 60c per line, or $7.20 per inch of 12 lines. Minimum charge $2.40. No discounts; no commissions. If no change in copy is desired, three continuous insertions are offered for the price of two. Read these instructions carefully. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Count your own copy to save delay. Be sure to enclose the correct amount of money with your order. Closing date—15th of preceding month. Example: January issue closes December 15th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

LARGE SHOVELS, CRANES AND DRAGLINES
2½ YDS. AND UP



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175-B Ward-Leonard electric shovel with 65' boom, 42' handle. Can handle 4 or 5 yard dipper for stripping or 7 yard dipper if used for coal loading. Operated one-third of time loading coal since shipment. Excellent condition. Can be demonstrated. Reasonably priced. Ready for immediate delivery. Box 3013

Caterpillar Steam Crane, equipped with dragline and 50 ft. boom which will handle a 3 yd. bucket. This machine in good repair, can be seen in our yard. Weighs 45 ton. Box 3016

Class 14 Steam Dragline, 70' boom, good condition, eastern location. Box 3020

SMALL SHOVELS, CRANES AND DRAGLINES UP TO 2½ YDS.

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½ yd. Bucyrus Crane—Clamshell—Dragline
1 yd. Northwest Crane—Clamshell—Dragline
1½ yd. Marion Shovel—Diesel
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1,000,000 Ton Strip Coal Mine in Illinois.
A. W. Nevers, Mt. Pleasant, Ia., Phone 32

FOR SALE

Walking Dragline, 60' boom, 1½ yd. bucket. Good condition; extra parts available. Eastern location. Box 3026

FOR SALE

One Type "D" Erie ¾ yard Steam Shovel Serial No. 2082. In operating condition. Price $1,200 f.o.b. Conasauga.
Conasauga River Lumber Co.,
Conasauga, Tenn.

FOR RENT

1—1½ yard gasoline shovel and backhoe with 36" and 42" bucket. Box 3023

1-YD. STEAM SHOVEL

Bucyrus-Erie 31-B steam shovel, 1 yd. dipper, 21'9" boom and 15' handle. Fair condition. Located Kansas City. Box 3029

FOR SALE

Erie Steam Shovel type B. Boiler newly retubed, ⅞ cu. yard bucket, dipper stick and boom very little used. 32' crane boom.
Badger-Rand Ice Company
Portsmouth, N. H.

1¼ yd. Koehring No. 2 crane shovel dragline Diesel 50 bulldozer.
Shovel attachment only for P&H Model 204. Box 3021

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1—10-B Shovel Front, Boom, Dipper Stick and Bucket, no cables, no lagging—in excellent condition, single rope crowd type. Suitable for machines 14760 and earlier. Priced reasonably. Atlanta. Box 3032

MISCELLANEOUS EQUIPT.

FOR SALE

Caterpillar diesel No. 11 Motor Patrol; Schramm water cooled air compressor—size 5¾x5x4; Tournapull wheels; Baker & Isaacson road rippers; Caterpillar diesel pump and block No. 2H 3513 W; Page automatic 2½ and 1 yd. dragline buckets, also asst. of tracks, rollers, gears and housings for AC, Int. and Caterpillars. Inquire what parts you need. **Sam, P.O. Box 182, East Point, Ga.**

FOR SALE
DRAGLINE BUCKETS

1—¾ cu. yd. Type AU Lightweight Dragline Bucket
2—1 cu. yd. Type AU Lightweight Dragline Bucket
2—1½ cu. yd. Type AU Lightweight Dragline Bucket
3—1¾ cu. yd. Type AU Lightweight Dragline Bucket
1—2 cu. yd. Type AU Lightweight Dragline Bucket.
1—2¼ cu. yd. Type AU Lightweight Dragline Bucket
1—2½ cu. yd. Type AU Lightweight Dragline Bucket
1—4 cu. yd. Type Y Special Heavy Duty Dragline Bucket
1—7 cu. yd. Type W Lightweight Dragline Bucket.

BUCYRUS-ERIE COMPANY
Parts Department
South Milwaukee Wisconsin

FOR SALE

One Barber-Greene loader—bucket type—suitable for coal or material. . Box 3031

10-B Erie Skeleton Trailer. Serial No. 150. Very good condition. Price $500. Box 3017

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3 Athey 16-yd. Crawler 2-way Dump Trailers
2 Athey 10-yd. Crawler 2-way Dump Trailers
all complete with hydraulic pumps.
1 B-E GA2 gas-air shovel with 1¼ yd. bucket.
Wm. H. Ziegler Co., Inc.
Minneapolis-St. Paul-Duluth-Crookston

FOR SALE or RENT

Buckeye No. 260 Ditcher in good mechanical condition. Twin City 6 cylinder gas motor. 9 ft. Cat. type rear tread, steel front wheels. Cuts 108" width, 24' deep, with extension 35' deep. Spoils dirt on either side. Price on application.

Buckeye No. 203 Ditcher in good mechanical condition. Twin City 4 cylinder gas motor. 7 ft. Cat. type rear tread, steel front wheels. Cuts 45" to 47½" width, 17' deep, with extension 21' deep. Spoils dirt on either side. Price on application.

Buckeye Wheel type Ditcher in good mechanical condition. Ford V8 motor. Cuts 24" width, 7' deep. Price on application.

Hendrix 2½ cu. yd. Dragline Bucket. Bucket in A1 condition, complete with dump sheaves, spreader bar and drag chains. Price on application.

All of the above can be inspected at shop in Alexandria, Louisiana. Box 3024

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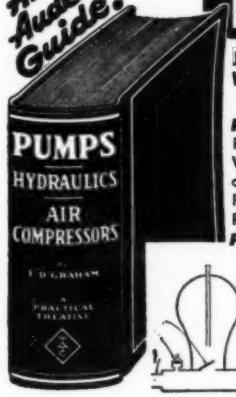

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3—½ cu. yd. Skimmer Scoop Dipper, 17-B
1—⅝ cu. yd. Dipper (inserted type with welded back and shell), 16-B
1—¾ cu. yd. Dipper (welded dipper with forged inserted reversible teeth), 21-B
1—1¼ cu. yd. Dragshovel Dipper, 33-B
1—1¼ cu. yd. Cast Front Dipper, GA3
1—1¼ cu. yd. Inserted Type Dipper, 30-B, 41-B, 42-B, 43-B, E2
1—1½ cu. yd. Heavy Duty-All Cast Dipper, 42-B
1—2 cu. yd. Rock Dipper, 75-B
1—2¼ cu. yd. Inserted Type Dipper, 50-B
1—2¼ cu. yd. Vanderhoef Type Dipper, 52-B
1—2¼ cu. yd. Inserted Type Dipper, 55-B
1—2¼ cu. yd. Rock Dipper, 75-B
2—2½ cu. yd. All Cast Dipper, 55-B
1—2⅞ cu. yd. Light Duty, Shovel Dipper, 54-B
1—3½ cu. yd. Coal Dipper, 75-B
1—4 cu. yd. Type IV Med. Duty Dipper, 100-B
1—8 cu. yd. Stripping Dipper, 320-B.

F.O.B. Works

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Bucyrus-Erie Company
Parts Department
South Milwaukee, Wisconsin

50-B BUCYRUS-ERIE SHOVEL PARTS
Steel boom, set dipper sticks, 40 H.P. crowd motor, 40 H.P. swing motor, 100 H.P. hoist motor. Located Northern Ohio District. Motors are for 440 volt, 3 phase, 60 cycle current. Box 3018

FOR SALE
Fairbanks Type R Truck Scale 50 Ton Cap., with 60'x10' platform, ¾" steel plate runners 2' wide full length. Cabinet type dial. Enclosed tare and capacity beams. Both graduated 60000 x 100. Near Spurgeon, Indiana.
Winslow Coal Corp., Petersburg, Ind.

FOR SALE
Bucyrus-Erie gas-air shovels, 1¼-yd., A-1, (2).
Vulcan 17-ton locomotive, steam, 36" gauge.
Porter 18-ton locomotive, steam, 36" gauge.
Davenport 19-ton locos., steam, 36" ga., (2).
Milwaukee 8-ton gasoline loco., std. ga.
Plymouth 25-ton gas loco., std. ga. (West).
Rogers 40-ton carryall trailer, semi, solids.
P&H ¾-yd. gas shovel, Model 204, 19' boom.
Gyratory crushers: 27", 21", 18", 12", 10", 8".
Newhouse 7" gyratory reduction crushers, (2).
Champion 24"x50" steel jaw crusher. Shovel 80-B.
Pioneer 300W port. gravel washing plant.
Portable Universal duplex stone crushing plant.
Koehring 34E dual drum paver, 1943 model.
Telsmith No. 540 rotary grizzly, plate feeder.
Worthington 5'x40' rotary dryer, ½" shell.
1000 HP hydroelectric plant, 60' head, A.C.
Bucyrus 50B shovels, (3), Diesel, elec., stm.
Bucyrus-Monighan Walker Diesel 3W dragline.
Euclid 6-yd. bottom dump cat. wagons (8).
Boiler tubes, new, 236—1¾" O.D. x 5', ferrules.

H. Y. SMITH CO.
828 N. Broadway Milwaukee 2, Wis.

FOR SALE
2 Sterling dump trucks, tractor TD9, and trailer, also Bucyrus Type B2 steam shovel. Box 3022

FOR SALE
Two 2-yard, 1938 Jaeger Truck Mixers, mounted on 1938 Ford V-8 chassis. Both mixers and trucks are in A-1 condition.
Thomas DeFalco
14 May St. Worcester, Mass.

FOR RENT
1 yd. Bucyrus-Erie 32-B
1¼ yd. Lorain 69
6 Sterling 5-yd. dump trucks (good condition) —one diesel powered
393 Brookline Street
Newton Center, Mass. Tel. LASell 4300

DREDGES

FOR SALE
12" Hydraulic Dredge with 10" discharge, 350 HP Superior Diesel and auxiliary motor, steel hull, house boat, and fuel barge. Location East Coast. Box 3027

FOR SALE
Self propelling steam ladder bucket dredge 223 ft. hull, 9 ft. draft, 50 ft. dredging depth, one yard buckets, location near Montreal. Box 3030

WANTED

WANTED
3—3 to 5 yd. end dump trucks in good operating condition. Diesel or gasoline powered.
Marquette Cement Mfg. Co.
140 S. Dearborn St.
Chicago, Ill.

WANTED
Need 4-6 Yard Dragline with 150 ft. boom or other machine capable of stripping 65 feet of dirt. Prefer to rent over a period of three to five years. Write or wire Box 3028

WANTED
Shovels, Cranes, Draglines, Bulldozers and Tractors with High-Lifts. State your best price when replying. Box 3015

POSITIONS WANTED

Address all box numbers
c/o EXCAVATING ENGINEER
South Milwaukee, Wis.

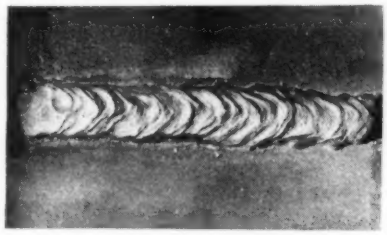
HELP WANTED
Sand Plant Supt. Good permanent position. Write complete qualifications, experience and place of birth, giving all dates, salary expected. Box 9225

EXPERIENCED OPERATOR
29 years experience—over draft age. Operated about every make and type shovel, dragline (up to 5 yds. capacity), crane, back hoe, steel erecting, wood & concrete pile driving, steam-gas-diesel. Can make own repairs. Furnish references. Prefers heavy const. work like steel setting, or heavy crane work. Available immediately for work anywhere. Located Wisconsin. Box 9224

Causes and Cures . . .

(Continued from page 222)

POOR SURFACE APPEARANCE



● Weld with poor surface appearance caused by excessive welding current and improper weave.

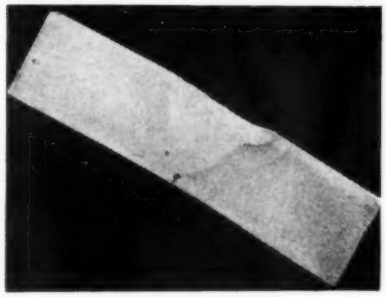
Cause

A Improper current and arc voltage.
B Overheated work.
C Poor electrode manipulation.
D Inherent characteristic of electrode used.

Cure

A Insure the use of the proper welding technique for the electrode used.
B Do not use excessive welding currents.
C Use a uniform weave or rate of travel at all times.
D Prevent overheating of work.

INCOMPLETE PENETRATION



● Incomplete penetration on vee-butt joint.

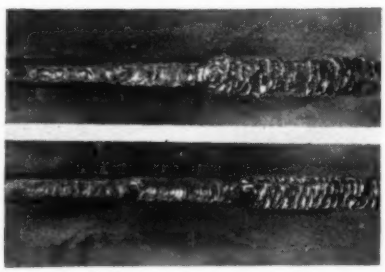
Cause

A Improper preparation of joint.
B Use of too large an electrode.
C Insufficient welding current.
D Too fast a welding speed.

Cure

A Be sure to allow the proper free space at the bottom of a weld.
B Do not expect excessive penetration from an electrode.
C Use small diameter electrodes in a narrow welding groove.
D Use sufficient welding current to obtain proper penetration. Do not weld too rapidly.

IRREGULAR WELD QUALITY



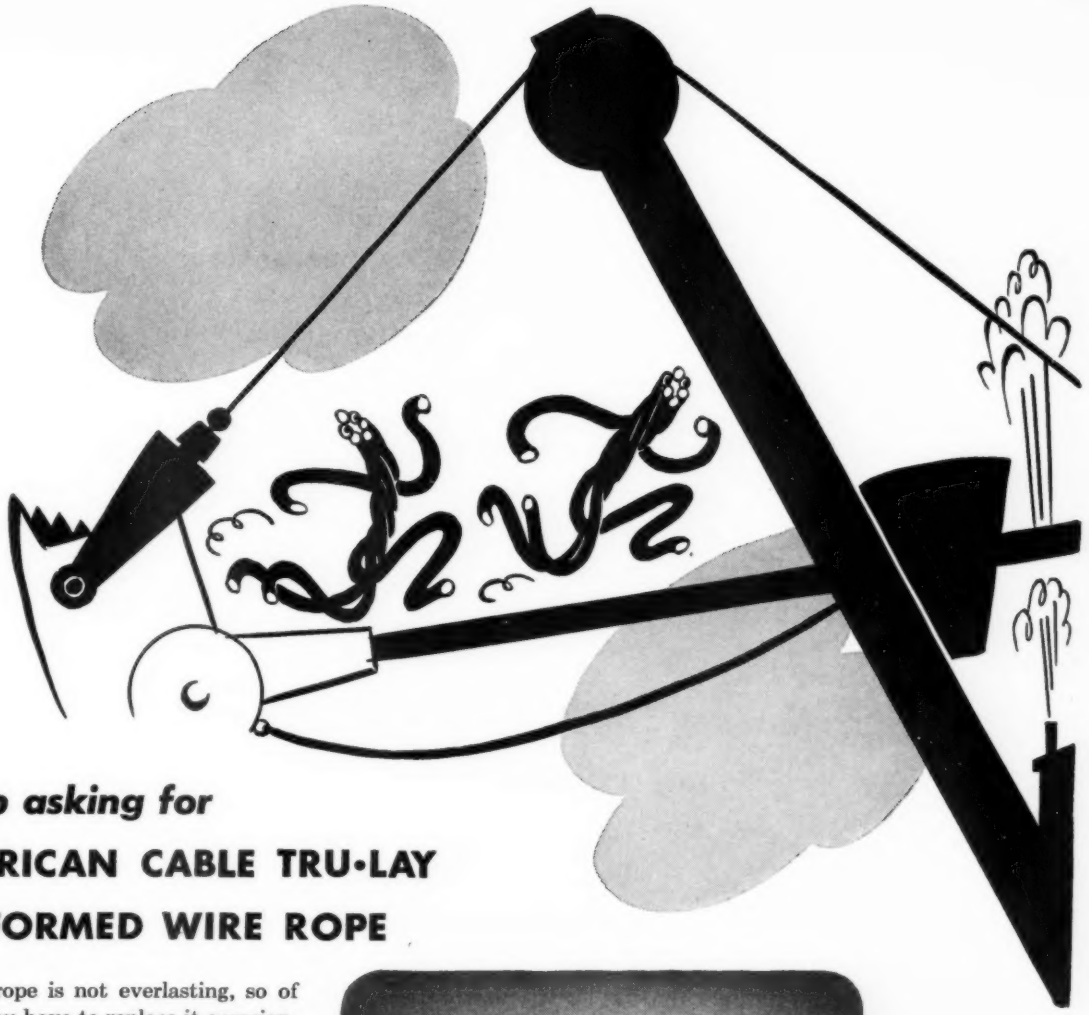
● Top: Poor vertical weld — improper electrodes, welding technique. Bottom: Good vertical weld —proper electrode, current and electrode manufacture.

Cause

A Improper electrode manipulation.
B Excessive welding current.
C Welding in improper position for which electrode is designed.
D Improper joint design.

Cure

A Use a uniform weave or rate of travel at all times.
B Do not use excessive welding currents.
C Use an electrode designed for the type of weld and the position in which the weld is to be made.
D Prepare all joints properly.



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PREFORMED WIRE ROPE

• Wire rope is not everlasting, so of course you have to replace it occasionally. With American Cable **TRU-LAY** Preformed the "occasion" is much less frequent because it invariably lasts longer. But when you *do* have to replace your ropes **TRU-LAY** handles much easier—it is much more flexible—it is far faster to install. This gets machines back into production sooner; saves man hours; saves money.

Because . . .
it is faster to install!

No wonder the Armed Forces take so much of our production!

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Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma

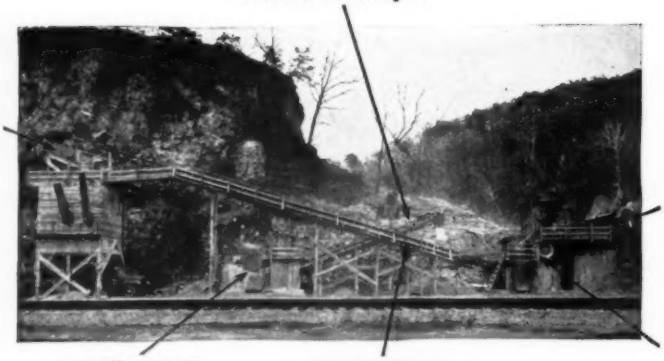
AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT • CONNECTICUT

ESSENTIAL PRODUCTS . . . TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, Yacht Rigging, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

1,000 TONS per DAY

with Universal Standard 6 Unit Plant



Over 100 tons per hour, 1,000 tons per day—day after day—of ballast, mostly 1½″ and 1″, are being turned out at minimum cost for the Burlington Railroad at Wyalusing, Wisc. This plant, one of a number owned by E. C. Schroeder of McGregor, Iowa, consists of 6 standard units selected as most suitable for this railside quarry. Timber was used wherever possible to conserve metal. Output is up to the expectations of all concerned.

This plant, made up of 6 "packaged" units and arranged to provide a minimum of handling, includes: a 20″ x 36″ roller bearing primary jaw crusher of Universal's exclusive light-strong Streamlined design; a 40″ x 24″ roller bearing star gear roll crusher for secondary reduction; 4′ x 8′ three deck gyrating screen; a 36″ x 8′ apron feeder with bar grizzly and by-pass (to by-pass fines around primary crusher); a 24″ x 108′ lattice frame conveyor from primary crusher to screen; and an 18″ x 44′ channel frame return conveyor. This is another case where soundly engineered standard units of the proper size selected from Universal's complete line were brought together to form an efficient, profitable plant. Probably we can do the same for you.

UNIVERSAL ENGINEERING CORPORATION

(Formerly
Universal Crusher Co.)

610 C Ave. West,
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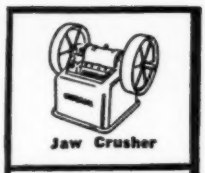
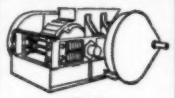
UNIVERSAL

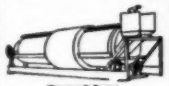
CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS


Jaw Crusher


Roll Crusher

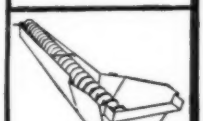
Gyrating Screen

Log Washer


Scrubber Screen

"Lattice" Conveyor

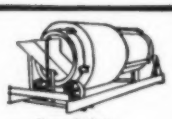
Mechanical Feeder


Sand Screw

Steel Bin

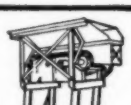
Rotovator

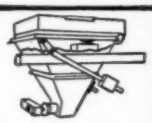
V-Belt Drive


Revolving Screen

Pulverizer

Bucket Elevator


Apron Feeder


Sand Tank